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SERVICE MANUAL

MULTIFUNCTIONAL DIGITAL SYSTEMS

e-STUDIO350/450
e-STUDIO352/452
e-STUDIO353/453

Model: DP-3520/3540/4520/4540
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- The official name of Windows 98 is Microsoft Windows 98 Operating System.
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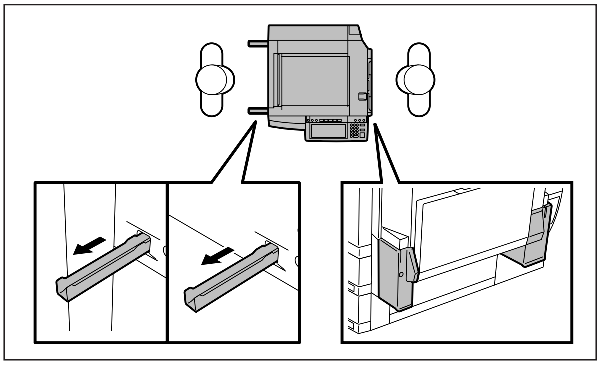
GENERAL PRECAUTIONS REGARDING THE INSTALLATION AND SERVICE FOR e-STUDIO350/352/353/450/452/453

The installation and service should be done by a qualified service technician.

1. **Transportation / Installation**
   - When transporting/installing the equipment, employ two persons and be sure to use the positions as indicated below.
     The equipment is quite heavy and weighs approximately 83kg (182.98 lb.): e-STUDIO350/450 / 86kg (189.59 lb): e-STUDIO352/353/452/453 therefore pay full attention when handling it.



   - Be sure not to hold the movable parts or units (e.g. the control panel, ADU or RADF) when transporting the equipment.
   - Be sure to use a dedicated outlet with AC 110V/13.2A, 115V or 127V / 12A, 220-240V or 240V / 8A for its power source.
   - The equipment must be grounded for safety.
     Never ground it to a gas pipe or a water pipe.
   - Select a suitable place for installation.
     Avoid excessive heat, high humidity, dust, vibration and direct sunlight.
   - Also provide proper ventilation as the equipment emits a slight amount of ozone.
   - To insure adequate working space for the copying operation, keep a minimum clearance of 80 cm (32”) on the left, 80 cm (32”) on the right and 10 cm (4”) in the rear.
   - The socket-outlet shall be installed near the equipment and shall be easily accessible.
   - Be sure to fix and plug in the power cable securely after the installation so that no one trips over it.

2. **Service of Machines**
   - Basically, be sure to turn the main switch off and unplug the power cord during service.
   - Be sure not to touch high-temperature sections such as the exposure lamp, the fuser unit, the damp heater and their periphery.
   - Be sure not to touch high-voltage sections such as the chargers, developer, IH control circuit, high-voltage transformer, exposure lamp control inverter, inverter for the LCD backlight and power supply unit. Especially, the board of these components should not be touched since the electric charge may remain in the capacitors, etc. on them even after the power is turned OFF.
   - Be sure not to touch rotating/operating sections such as gears, belts, pulleys, fan, etc.
   - Be careful when removing the covers since there might be the parts with very sharp edges underneath.
   - When servicing the machines with the power turned ON, be sure not to touch live sections and rotating/operating sections. Avoid exposure to laser radiation.

- Use suitable measuring instruments and tools.
- Avoid exposure to laser radiation during servicing.
  - Avoid direct exposure to the beam.
  - Do not insert tools, parts, etc. that are reflective into the path of the laser beam.
  - Remove all watches, rings, bracelets, etc. that are reflective.
- Unplug the power cable and clean the area around the prongs of the plug once a year or more. A fire may occur when dust lies on this area.

3. **Main Service Parts for Safety**
   - The breaker, door switch, fuse, thermostat, thermofuse, thermistor, etc. are particularly important for safety. Be sure to handle/install them properly. If these parts are shorted circuit and/or made their functions out, they may burn down, for instance, and may result in fatal accidents. Do not allow a short circuit to occur. Do not use the parts not recommended by Toshiba TEC Corporation.

4. **Cautionary Labels**
   - During servicing, be sure to check the rating plate and the cautionary labels such as “Unplug the power cord during service”, “Hot area”, “Laser warning label” etc. to see if there is any dirt on their surface and whether they are properly stuck to the equipment.

5. **Disposition of Consumable Parts, Packing Materials, Used batteries and RAM-ICs**
   - Regarding the recovery and disposal of the equipment, supplies, consumable parts, packing materials, used batteries and RAM-ICs including lithium batteries, follow the relevant local regulations or rules.

6. **Reassembly of disassembled parts is the reverse of the disassembly unless otherwise noted in this manual or other related documents.**
   Care should be taken that small parts, such as screws, washers, pins, E-rings, star washers, harnesses are not installed in the wrong places.

7. **Basically, the machine should not be operated with any parts removed or disassembled.**

8. **Precautions Against Static Electricity**
   - The PC board must be stored in an anti-electrostatic bag and handled carefully using a wristband, because the ICs on it may become damaged due to static electricity.

   Caution: Before using the wristband, pull out the power cord plug of the equipment and make sure that there are no uninsulated charged objects in the vicinity.

Caution : Dispose of used batteries and RAM-ICs including lithium batteries according to this manual.
Attention : Se débarrasser de batteries et RAM-ICs usés y compris les batteries en lithium selon ce manuel.
Vorsicht : Entsorgung der gebrauchten Batterien und RAM-ICs (inklusive der Lithium-Batterie) nach diesem Handbuch.

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1. SPECIFICATIONS / ACCESSORIES / OPTIONS / SUPPLIES

1.1 Specifications

Values in [ ] are for e-STUDIO450/452/453 in case that the specification is different between e-STUDIO350/352/353 and e-STUDIO450/452/453.

• Copy process	Indirect electrophotographic process (dry)
• Type	Desktop type (console type: when paper feed pedestal (PFP) and large capacity feeder (LCF) are installed)
• Original table	Fixed type (the left rear corner used as guide to place originals)
• Accepted originals	Sheet, book and 3-dimensional object. The reversing automatic document feeder (RADF) only accepts paper which are not pasted or stapled. Carbon paper are not acceptable either. Maximum size : A3/LD

	Single-sided originals	Double-sided originals
MR-3015	50 to 127 g/m^2 (13 lb. Bond to 34 lb. Bond)	50 to 105 g/m^2 (13 lb. Bond to 28 lb. Bond)
MR-3018	35 to 157 g/m^2 (9.3 lb. Bond to 58 lb. Cover)	50 to 157 g/m^2 (13 lb. Bond to 58 lb. Cover)

• Copy speed (Copies/min.)

e-STUDIO350/352/353

Paper size Paper size	Drawer	Bypass feed		PFP	LCF
		Size specified	Size not specified		
A4, LT, B5	35	35	18	35	35
A4-R, B5-R, A5-R, LT-R, ST-R	25	25	18	25	–
B4, LG	21	21	18	21	–
A3, LD	18	18	18	18	–

e-STUDIO450/452/453

Paper size Paper size	Drawer	Bypass feed		PFP	LCF
		Size specified	Size not specified		
A4, LT, B5	45	40	21	45	45
A4-R, B5-R, A5-R, LT-R, ST-R	28	28	21	28	–
B4, LG	24	24	21	24	–
A3, LD	21	21	21	21	–

* "–" means "Not acceptable".

* The copy speed in the above table are available when originals are manually placed for single side, multiple copying.

* When the RADF is used, the copy speed of 35[45] sheets per minute is only available under the following conditions:

• Original/Mode:	Single side original/A4/LT size. APS/automatic density are not selected.
• Number of sheets:	35[45] or more.
• Paper feeding:	LCF
• Reproduction ratio:	100%

* System copy speed

Copy mode		Sec.	
		e-STUDIO 350/352/353	e-STUDIO 450/452/453
Single-sided originals ↓ Single-sided copies	1 set	20.85	17.49
	3 sets	57.95	46.68
	5 sets	91.20	73.50
Single-sided originals ↓ Double-sided copies	1 set	27.42	25.71
	3 sets	62.18	57.41
	5 sets	97.55	89.03
Double-sided originals ↓ Double-sided copies	1 set	55.47	54.68
	3 sets	126.21	118.07
	5 sets	196.93	181.36
Double-sided originals ↓ Single-sided copies	1 set	48.22	48.20
	3 sets	117.44	102.18
	5 sets	184.96	155.06

* The system copy speed, including scanning time, is available when 10 sheets of A4/LT size original are set on RADF and one of the copy modes in the left table is selected.

The period of time from pressing [START] to the paper exit completely out of the equipment based on the actually measured value.

* Upper drawer is selected and copying is at the non-sort mode.

* Automatic copy density, APS/AMS are turned off.

* Finisher is not installed.

	Drawer	ADU	PFP	LCF	Bypass copy	Remarks
Size	A3 to A5-R LD to ST-R			A4, LT	A3 to A5-R,LD to ST-R (Non-standard or user-specified sizes can be set.)	
Weight	64 to 105 g/m2 17 to 28 lb.				64 to 209 g/m2, 17 to 55 lb. (Continuous feeding) 50 to 209 g/m2, 13 to 55 lb. (Single paper feeding)	
Special paper	-				Tracing paper, labels, OHP film (thickness: 80 µm or thicker)	These special papers recommended by Toshiba Tec

- First copy time................... e-STUDIO350/352/353: Approx. 3.9sec. or less
  e-STUDIO450/452/453: Approx. 3.9sec. or less
  (A4/LT, upper drawer, 100%, original placed manually)
- Warming-up time............... Approx. 20 seconds (temperature: 20°C)
- Multiple copying .... Up to 999 copies; Key in set numbers
- Reproduction ratio............. Actual ratio: 100±0.5%
  Zooming: 25 to 400% in increments of 1%
  (25 to 200% when using RADF)
- Resolution/Gradation .... Scanning: 600 dpi x 600 dpi
  .... Printing: Equivalent to 2400 dpi x 600 dpi
  .... Gradation: 256 steps

- Eliminated portion .... Leading edges : 3.0±2.0 mm, Side/trailing edges : 2.0±2.0 mm (copy)
  Leading / trailing edges : 5.0±2.0 mm, Side edges : 5.0±2.0 mm (print)
- Paper feeding .... Automatic feeding : Standard drawers–2 drawers (stack height 60.5 mm, equivalent to 550 sheets; 64 to 80 g/m^2 (17 to 22 lb.))
  PFP–Option (One drawer or two : stack height 60.5 mm, equivalent to 550 sheets; 64 to 80 g/m^2 (17 to 22 lb.)
  LCF–Option (Stack height 137.5 mm x 2: equivalent to 2500 sheets; 64 to 80 g/m2 (17 to 22 lb.))
  Bypass feeding: (Stack height 11 mm : equivalent to 100 sheets; 64 to 80 g/m^2 (17 to 22 lb.))
- Capacity of originals in the reversing automatic document feeder (Option)
  .... A3 to A5-R, LD to ST-R : 100 sheets / 80 g/m^2 (Stack height 16 mm or less)
- Automatic duplexing unit .. Stackless, Switchback type
- Toner supply .... Automatic toner density detection/supply
  Toner cartridge replacing method
- Density control .... Automatic density mode and manual density mode selectable in 11 steps
- Weight .... 83 kg, 183 lb. (e-STUDIO350/450)
  86 kg, 189.59 lb. (e-STUDIO352/353/452/453)
- Power requirements .... AC 110V (±10%) / 13.2A, 115V (±10%) or 127V (±10%) / 12A
  220-240V (±10%) or 240V (±10%) / 8A
- Power consumption .... 1.5 kW or less (115V series, 200V series)

  * The electric power is supplied to the RADF, Finisher, Job Separator, Offset Tray, PFP and LCF through the equipment.
- Total counter .... Electronical counter

- Dimensions of the equipment .... See the figure below
  W660 x D718 x H739 mm (e-STUDIO350/450)
  W660 x D758 x H739 mm (e-STUDIO352/353/452/453)

  * When the tilt angle of the control panel is 45 degrees.

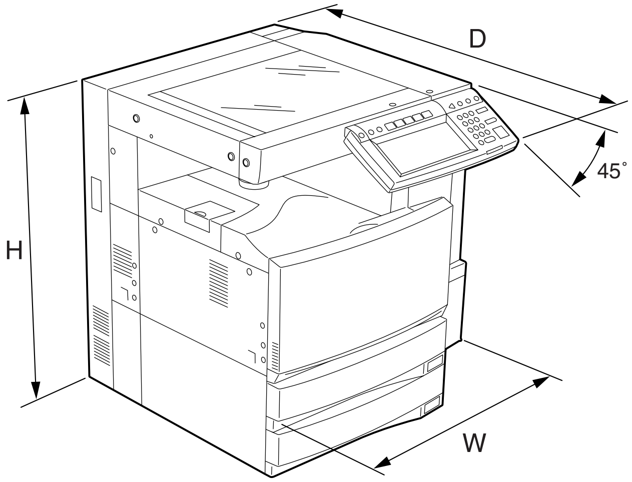


Fig. 1-101

1.2 Accessories

Unpacking/setup instruction	1 set
Operator’s manual	4 pcs. (except for MJD)
Operator's manual pocket	1 pc.
Power cable	1 pc.
Warranty sheet	1 pc. (for NAD)
Setup report	1 set (for NAD and MJD)
Customer satisfaction card	1 pc. (for MJD)
PM sticker	1 pc. (for MJD)
Drum (installed inside of the equipment)	1 pc.
Toner bag	1 pc.
Toner cartridge	1 pc. (except for NAD, MJD)
Developer material	1 pc. (except for NAD,MJD)
Operation panel stopper	1 pc.
Blind seal	1 pc.
Rubber plug	4 pcs.
CD-ROM	4 pcs.
Platen cover	1 pc. (for CND)

* Machine version

NAD:	North America
MJD:	Europe
AUD:	Australia
ASD:	Central and South America / Hong Kong / Asia
TWD:	Taiwan
SAD:	Saudi Arabia
JPD:	Japan
CND:	China
ASU:	Asia
KRD:	Korea

1.3 Options

1.3.1 e-STUDIO350/450

Platen Cover	KA-3511 PC/PC-C
Reversing Automatic Document Feeder (RADF)	MR-3015
Drawer Module	MY-1021 /-C
Paper Feed Pedestal (PFP)	KD-1011 /-C
Large Capacity Feeder (LCF)	KD-1012 A4/LT/A4-C
Finisher (Hanging type)	MJ-1022 /-C
Finisher (Console type)	MJ-1023 /-C
Finisher (Console saddle stitcher type)	MJ-1024 /-C
Hole Punch Unit	MJ-6004 N/E/F/S *1
Staple Cartridge	STAPLE-1600 (for MJ-1022) STAPLE-2000 (for MJ-1023/1024) STAPLE-600 (for MJ-1024)
Bridge Kit	KN-3520 /-C
Job Separator	MJ-5004 /-C
Offset Tray	MJ-5005 /-C
Key Copy Counter	MU-8, MU-10
Work Tray	KK-3511
Damp Heater	MF-3520 U/E
Fax Board	GD-1150 NA/AU/EU/TW/C/AS
2nd Line for Fax Board	GD-1160 NA/EU/TW/C
Wireless LAN Adapter	GN-1010
PCI Slot	GO-1030
Scrambler Board	GP-1030
Printer Kit	GM-1010
Printer/Scanner Kit	GM-2010
Scanner upgrade Kit	GM-3010
Desk	MH-1700
Data overwrite kit	GP-1050

* 1) N : North America E : Europe F : France S : Sweden

Notes:

1. The bridge unit (KN-3520) is necessary for installation of the finisher (MJ-1022, MJ-1023 or MJ-1024).
2. The finisher (MJ-1023 or MJ-1024) is necessary for installation of the hole punch unit (MJ-6004N/E/F/S).
3. The PCI slot (GO-1030) is necessary for installation of the scrambler board (GP-1030).

1.3.2 e-STUDIO352/353/452/453

Platen cover	KA-3511PC
Reversing Automatic Document Feeder (RADF)	MR-3018
Drawer module	MY-1021/-C
Paper Feed Pedestal (PFP)	KD-1011/-C
Large Capacity Feeder (LCF)	KD-1012LT/A4/A4-C
Finisher (Hanging type) : e-STUDIO352/353 only	MJ-1022/-C
Finisher (Console type)	MJ-1101
Finisher (Console type)	MJ-1023/-C
Finisher (Console saddle stitcher type)	MJ-1024/-C
Hole punch unit (for MJ-1101)	MJ-6101N/E/F/S
Hole punch unit (for MJ-1023/1024)	MJ-6004N/E/F/S
Staple cartridge	STAPLE-1600 (for MJ-1022) STAPLE-2400 (for MJ-1101) STAPLE-2000 (for MJ-1023/1024) STAPLE-600 (for saddle stitcher of MJ-1024)
Bridge kit	KN-3520/-C
Job separator	MJ-5004/-C
Offset tray	MJ-5005/-C
Work tray	KK-3511/-C
Damp heater	MF-3520U/E
Fax board	GD-1200NA/EU/AU/AS/C/TW/KR
2nd line for fax board	GD-1160NA/EU-N/C/TW
Printer kit	GM-1060/1061
Printer/Scanner kit	GM-2060/2061
Scanner kit	GM-4060
Printer ELK	GM-1120
Printer/Scanner ELK	GM-2120
Scannner ELK	GM-4120
Memory	GC-1230
Scrambler board	GP-1040
Wireless LAN module	GN-1041
Bluetooth module	GN-2010
Antenna	GN-3010
Data overwrite kit	GP-1060
PCI slot	GO-1060
e-BRIDGE ID Gate (HID iClass)	KP-2004
e-BRIDGE ID Gate (MIFARE)	KP-2005
Desk	MH-1700
Harness kit for coin controller	GQ-1020

Notes:

1. The bridge kit (KN-3520) is necessary for installation of the finisher (MJ-1022, MJ-1023/1024 or MJ-1101).
2. The finisher (MJ-1023/1024) is necessary for installation of the hole punch unit (MJ-6004N/E/F/S). The finisher (MJ-1101) is necessary for installation of the hole punch unit (MJ-6101N/E/F/S).
3. The PCI slot (GO-1060) is necessary for the installation of the scrambler board (GP-1040).
4. The antenna (GN-3010) is necessary to enable the wireless LAN module (GN-1041) and Bluetooth module (GN-2010).
5. When the wireless LAN module (GN-1041) and the Bluetooth module (GN-2010) are installed, only 1 antenna (GN-3010) can be connected to each.
6. The Printer kit (GM-1060) or Printer/Scanner kit (GM-2060) does not have a function for printing an XPS file.
7. To enable an XPS file to be printed by the Printer kit (GM-1061) or Printer/Scanner kit (GM-2061), the Memory (GC-1230) is required to be installed.
8. To enable an XPS file to be printed by the Printer ELK (GM-1120) or Printer/Scanner ELK (GM-2120), the Memory (GC-1230) is required to be installed.

1.4 Supplies

Drum	OD-3500
Toner bag	PS-TB3520 /E/N *2
Toner cartridge	PS-ZT3520 /T/D/C/E *3 (e-STUDIO350/352/450/452) PS-ZT3520 C *3, PS-ZT4520 /E *3 (e-STUDIO353/453)
Developer	D-3500

* 2)	N : Asia	E : Europe	NONE : North America		
* 3)	T : Taiwan	D : Asia	C : China	E : Europe	NONE : North America

1.5 System List

1.5.1 e-STUDIO350/450

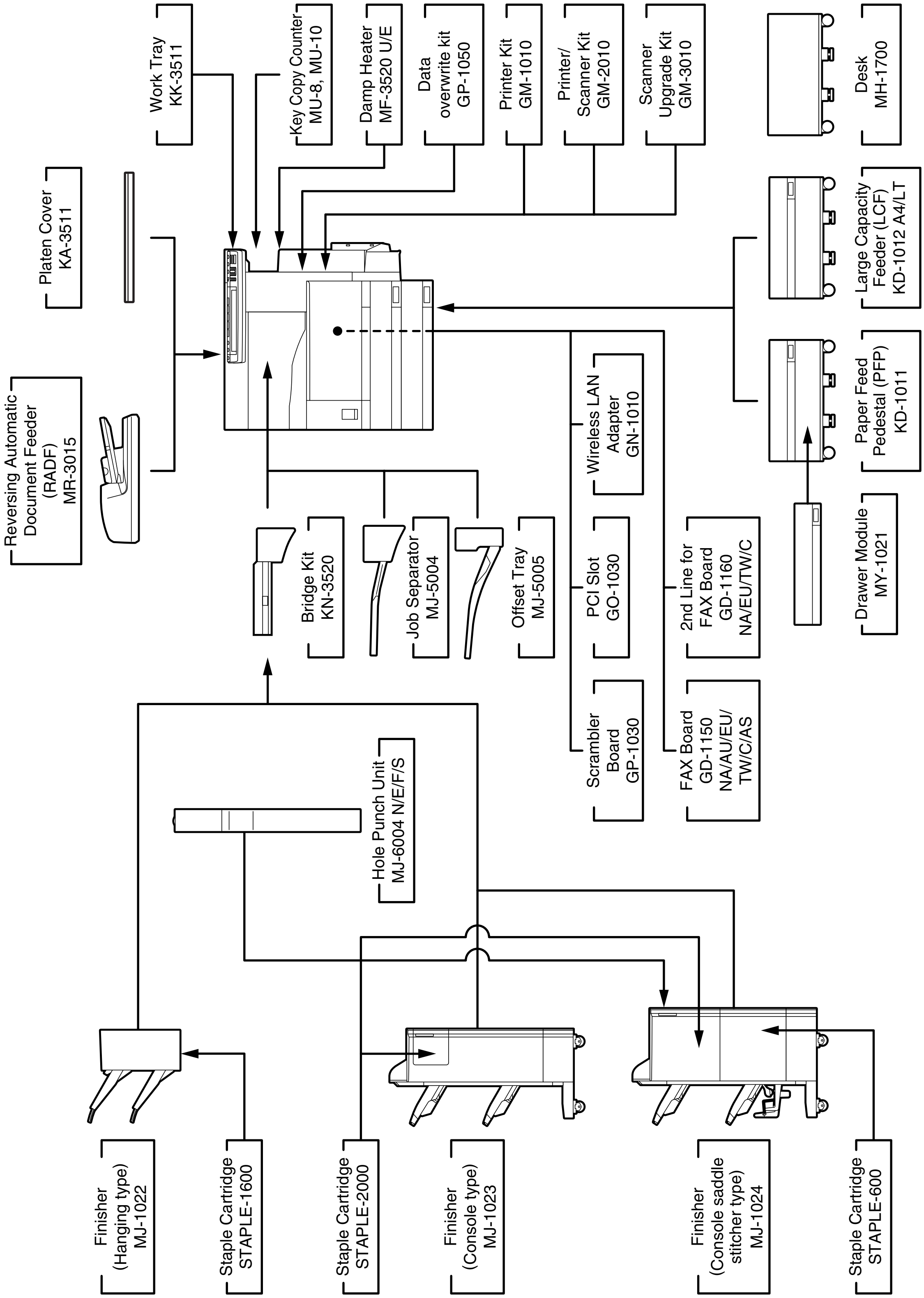

Work Tray
KK-3511
Key Copy Counter
MU-8, MU-10
Damp Heater
MF-3520 U/E
Data
overwrite kit
GP-1050
Printer Kit
GM-1010
Printer/
Scanner Kit
GM-2010
Scanner
Upgrade Kit
GM-3010
Desk
MH-1700
Platen Cover
KA-3511
Large Capacity
Feeder (LCF)
KD-1012 A4/LT
Reversing Automatic
Document Feeder
(RADF)
MR-3015
Wireless LAN
Adapter
GN-1010
Paper Feed
Pedestal (PFP)
KD-1011
Bridge Kit
KN-3520
Job Separator
MJ-5004
Offset Tray
MJ-5005
PCI Slot
GO-1030
2nd Line for
FAX Board
GD-1160
NA/EU/TW/C
Drawer Module
MY-1021
Scrambler
Board
GP-1030
FAX Board
GD-1150
NA/AU/EU/
TW/C/AS
Hole Punch Unit
MJ-6004 N/E/F/S
Finisher
(Hanging type)
MJ-1022
Staple Cartridge
STAPLE-1600
Staple Cartridge
STAPLE-2000
Finisher
(Console type)
MJ-1023
Finisher
(Console saddle
stitcher type)
MJ-1024
Staple Cartridge
STAPLE-600

Fig. 1-501

1.5.2 e-STUDIO352/353/452/453

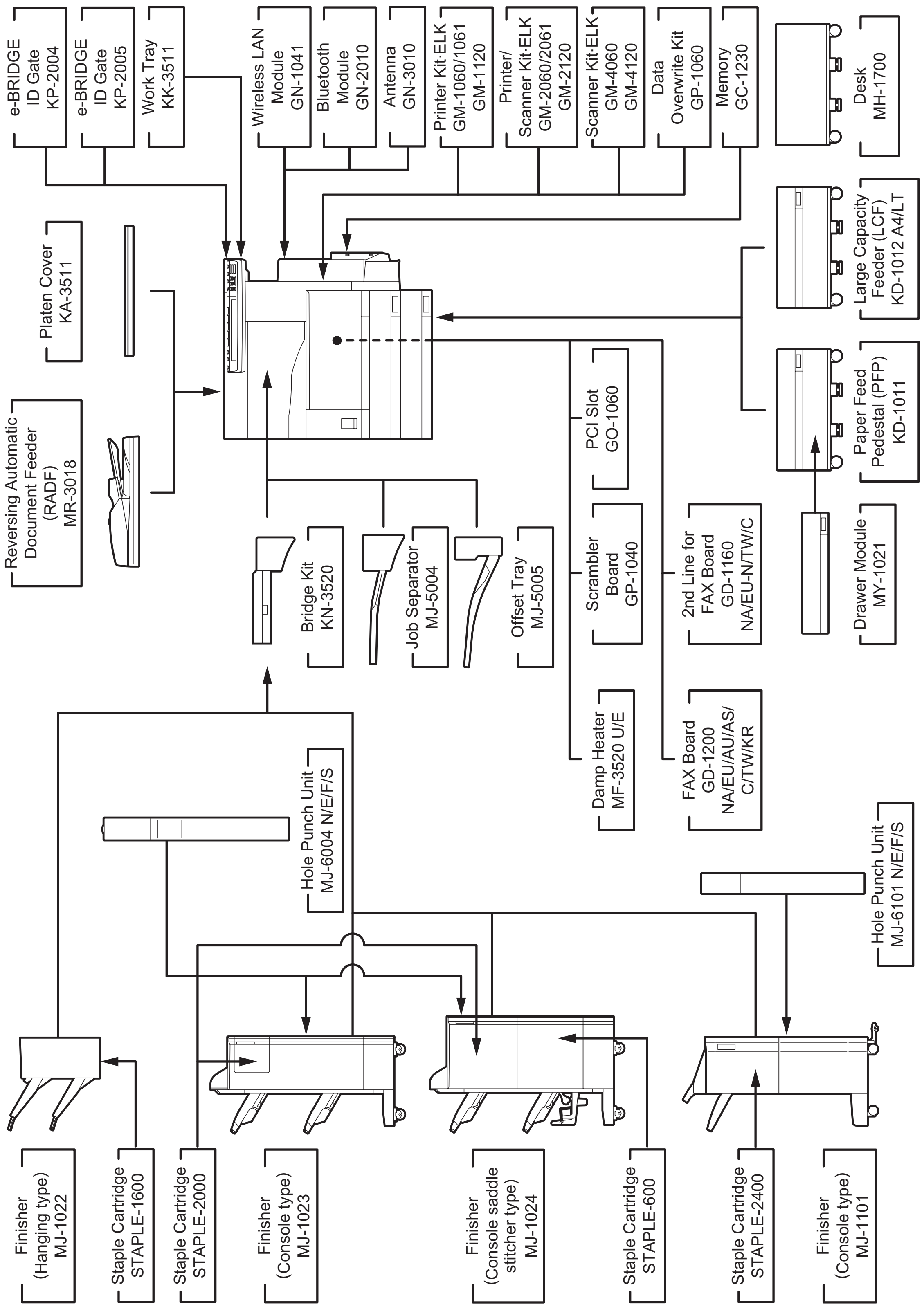
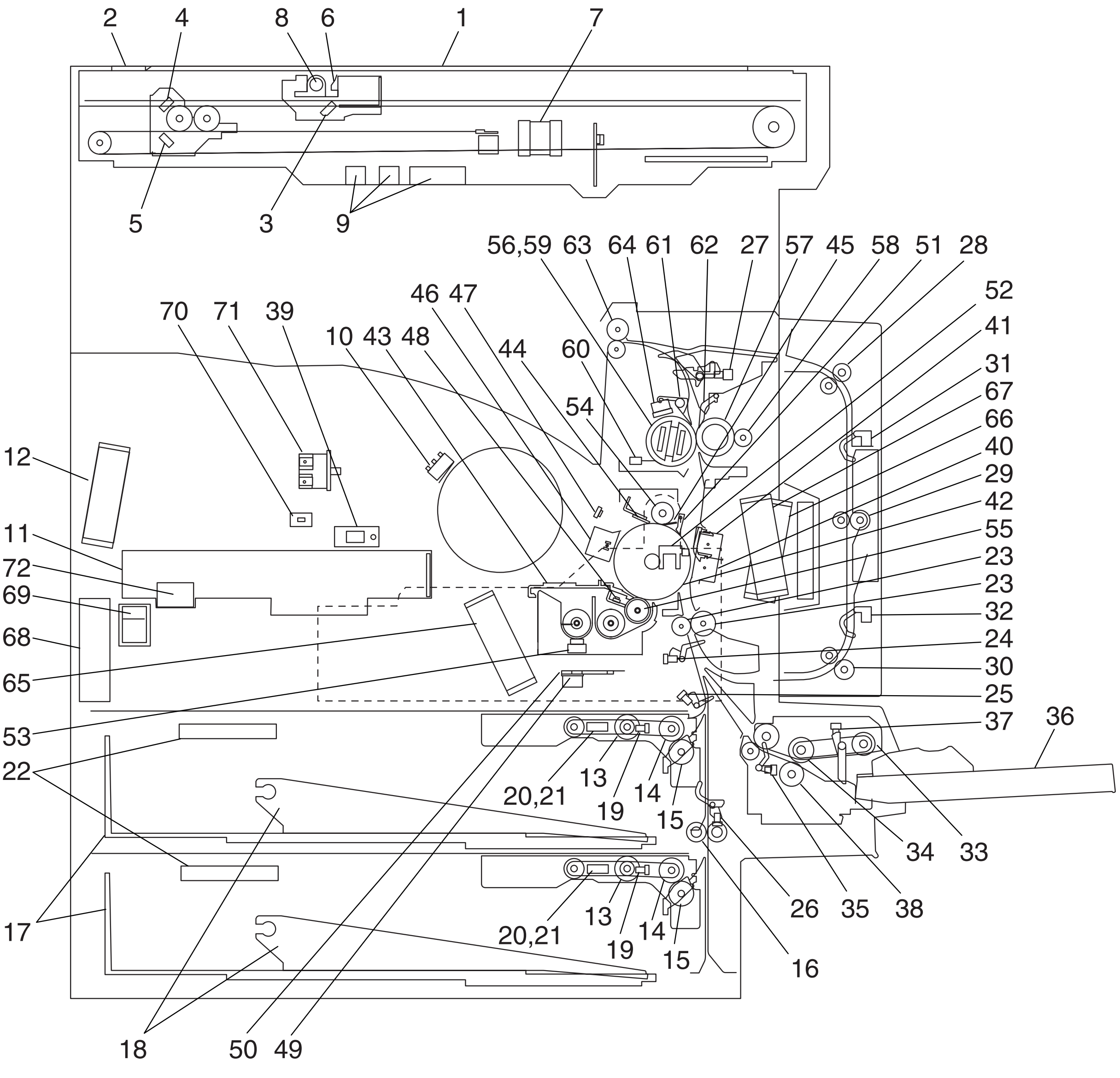

e-BRIDGE ID Gate KP-2004
e-BRIDGE ID Gate KP-2005
Work Tray KK-3511
Wireless LAN Module GN-1041
Bluetooth Module GN-2010
Antenna GN-3010
Printer Kit·ELK GM-1060/1061 GM-1120
Printer/ Scanner Kit·ELK GM-2060/2061 GM-2120
Scanner Kit·ELK GM-4060 GM-4120
Data Overwrite Kit GP-1060
Memory GC-1230
Desk MH-1700
Platen Cover KA-3511
Large Capacity Feeder (LCF) KD-1012 A4/LT
Reversing Automatic Document Feeder (RADF) MR-3018
PCI Slot GO-1060
Paper Feed Pedestal (PFP) KD-1011
Bridge Kit KN-3520
Job Separator MJ-5004
Offset Tray MJ-5005
Scrambler Board GP-1040
2nd Line for FAX Board GD-1160 NA/EU-N/TW/C
Drawer Module MY-1021
Damp Heater MF-3520 U/E
FAX Board GD-1200 NA/EU/AU/AS/ C/TW/KR
Hole Punch Unit MJ-6004 N/E/F/S
Hole Punch Unit MJ-6101 N/E/F/S
Finisher (Hanging type) MJ-1022
Staple Cartridge STAPLE-1600
Staple Cartridge STAPLE-2000
Finisher (Console type) MJ-1023
Finisher (Console saddle stitcher type) MJ-1024
Staple Cartridge STAPLE-600
Staple Cartridge STAPLE-2400
Finisher (Console type) MJ-1101

Fig. 1-502

2. OUTLINE OF THE MACHINE

2.1 Sectional View


2
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65
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22
17
18
50
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20,21
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20,21
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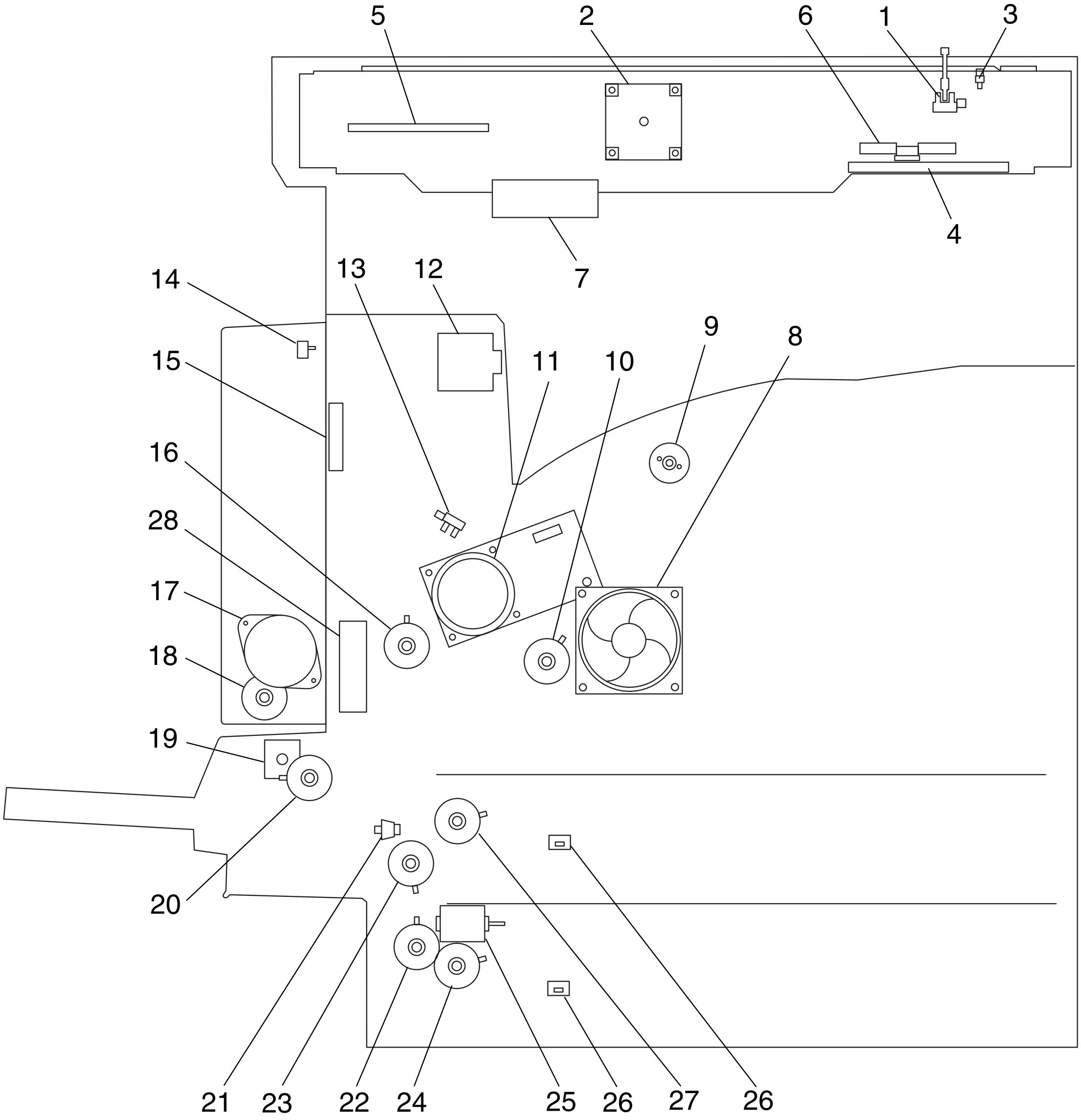
26
35
38
16

Fig. 2-101

1	Original glass	37	Bypass paper sensor
2	ADF original glass	38	Bypass separation roller
3	Mirror-1	39	Temperature/humidity sensor
4	Mirror-2	40	Transfer charger
5	Mirror-3	41	Separation charger
6	Reflector	42	Drum
7	Lens	43	Developer unit
8	Exposure lamp	44	Cleaning blade
9	Automatic original detection sensor	45	Recovery blade
10	Toner cartridge switch	46	Main charger
11	Laser unit	47	Discharge LED
12	Laser unit cooling fan	48	Drum thermistor
13	Drawer pickup roller	49	Drum damp heater thermostat
14	Drawer feed roller	50	Drum damp heater
15	Drawer separation roller	51	Separation finger for drum
16	Drawer transport roller	52	Toner bag full detection sensor-2
17	Drawer	53	Auto-toner sensor
18	Drawer tray	54	Toner recovery auger
19	Drawer tray-up sensor	55	Developer sleeve (magnetic roller)
20	Drawer empty sensor	56	Fuser roller
21	Drawer paper stock sensor	57	Pressure roller
22	Drawer damp heater (JPD only)	58	Cleaning roller
23	Registration roller	59	IH coil
24	Registration sensor	60	Main thermistor / Edge thermistor
25	Upper drawer feed sensor	61	Separation finger for fuser roller
26	Lower drawer feed sensor	62	Separation finger for pressure roller
27	Exit sensor	63	Exit roller
28	ADU upper transport roller	64	Fuser thermostat
29	ADU middle transport roller	65	Middle fan
30	ADU lower transport roller	66	Exhaust fan
31	ADU entrance sensor	67	Sub-separation fan
32	ADU exit sensor	68	Power supply cooling fan
33	Bypass pickup roller	69	Main switch
34	Bypass feed roller	70	Front cover opening/closing switch
35	Bypass feed sensor	71	Cover opening/closing interlock switch
36	Bypass tray	72	Polygonal motor


5
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26

Fig. 2-102

1	Platen sensor	15	Fuser unit cooling fan
2	Scan motor	16	Registration clutch
3	Carriage home position sensor	17	ADU motor
4	Scanner damp heater (Left)	18	ADU clutch
5	Scanner damp heater (Right)	19	Bypass pickup solenoid
6	Scanner damp heater thermostat	20	Bypass feed clutch
7	IH board cooling fan	21	Side cover opening/closing switch
8	Developer unit cooling fan-1	22	Transport clutch (High speed)
9	Toner motor	23	Transport clutch (Low speed)
10	Developer drive clutch	24	Lower drawer feed clutch
11	Main motor	25	Tray-up motor
12	Exit motor	26	Drawer detection switch
13	Toner bag full detection sensor-1	27	Upper drawer feed clutch
14	ADU opening/closing switch	28	Developer unit cooling fan-2

2.2 Electric Parts Layout

[A] Unit construction

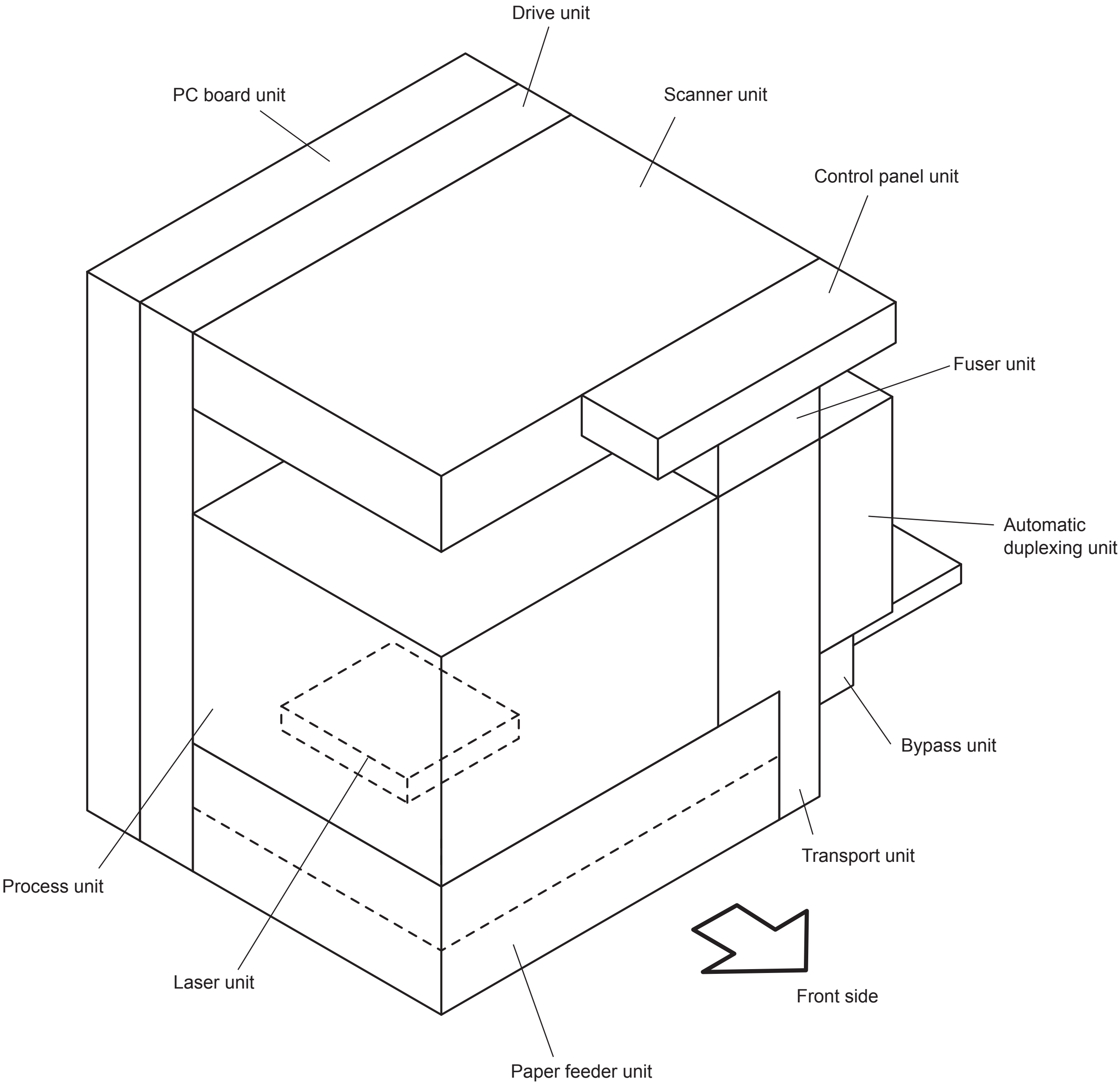

Drive unit
PC board unit
Scanner unit
Control panel unit
Fuser unit
Automatic duplexing unit
Bypass unit
Transport unit
Process unit
Laser unit
Front side
Paper feeder unit

Fig. 2-201

[B] Scanner unit

(B-1) Motor, sensor, lamp

A4 series

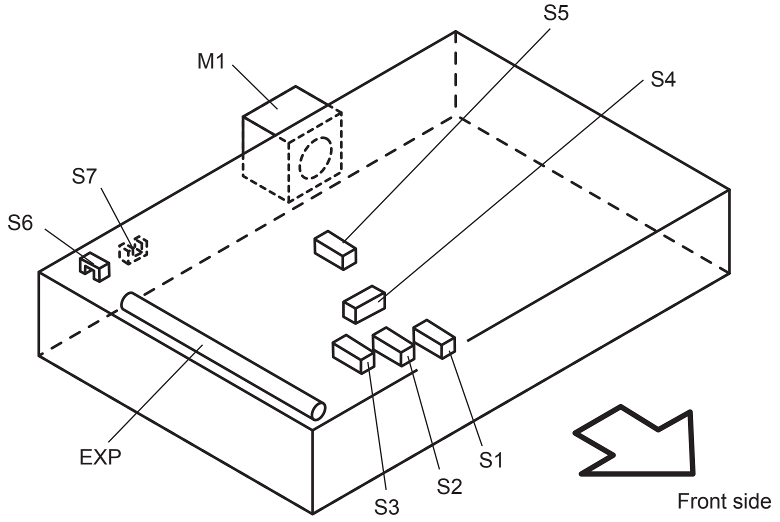

S5
M1
S4
S7
S6
EXP
S1
S2
S3
Front side

Fig. 2-202-1

LT series

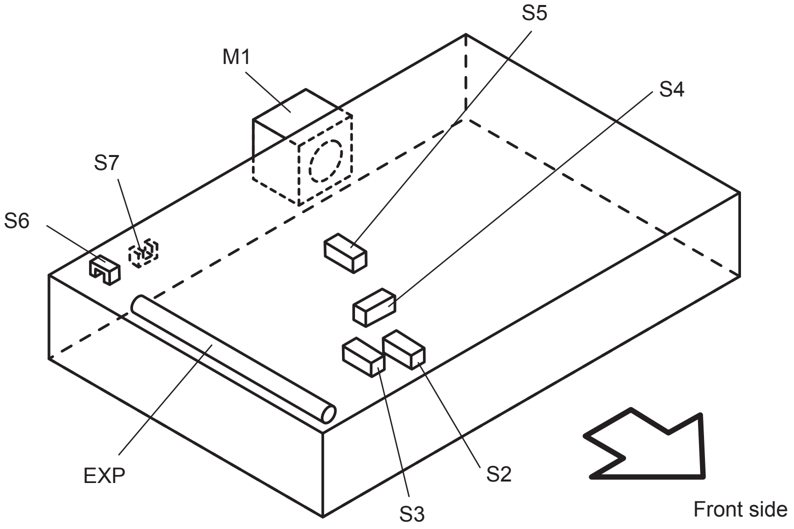

S5
M1
S4
S7
S6
EXP
S2
S3
Front side

Fig. 2-202-2

(B-2) PC board, heater, thermostat, other part

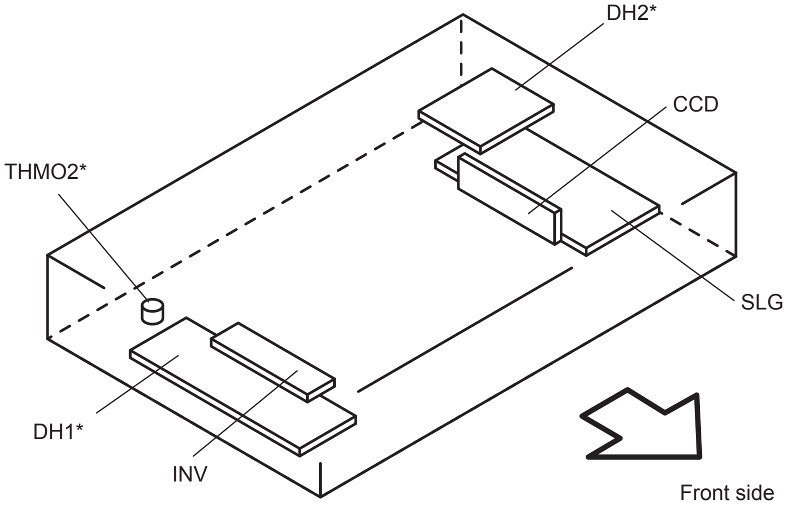

DH2*
CCD
THMO2*
SLG
DH1*
INV
Front side

Fig. 2-203

* ASD/AUD/CND/SAD/TWD models : Standard

NAD/MJD models : Option

[C] Control panel unit

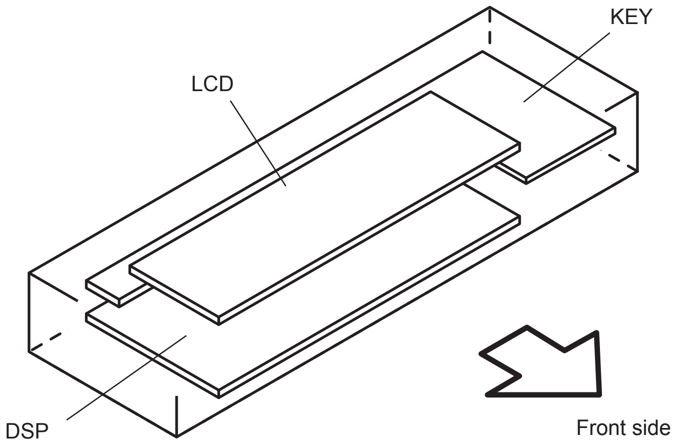

KEY
LCD
DSP
Front side

Fig. 2-204

[D] Process unit

(D-1) Motor, sensor, switch, PC board

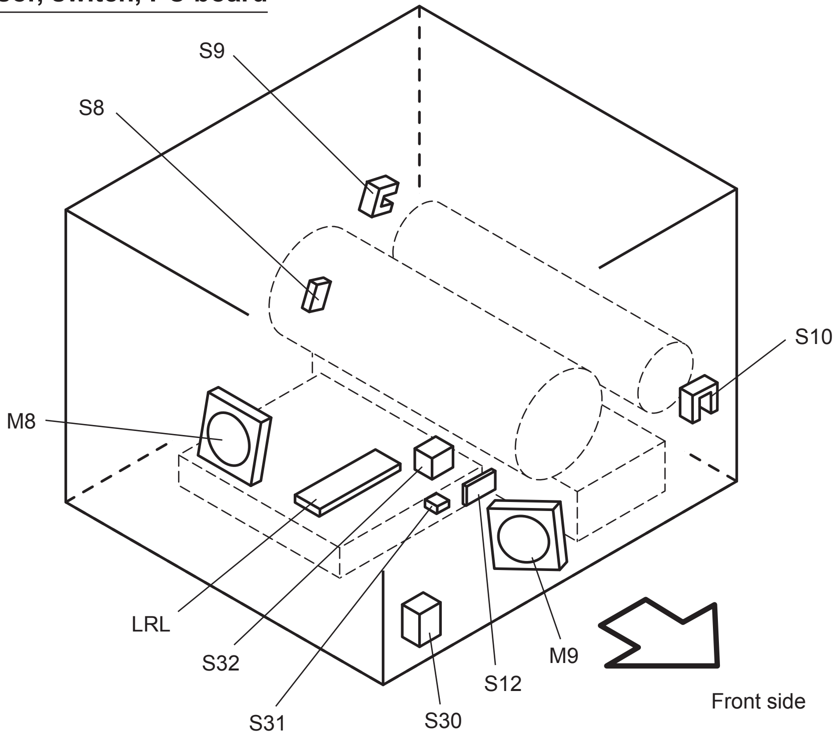
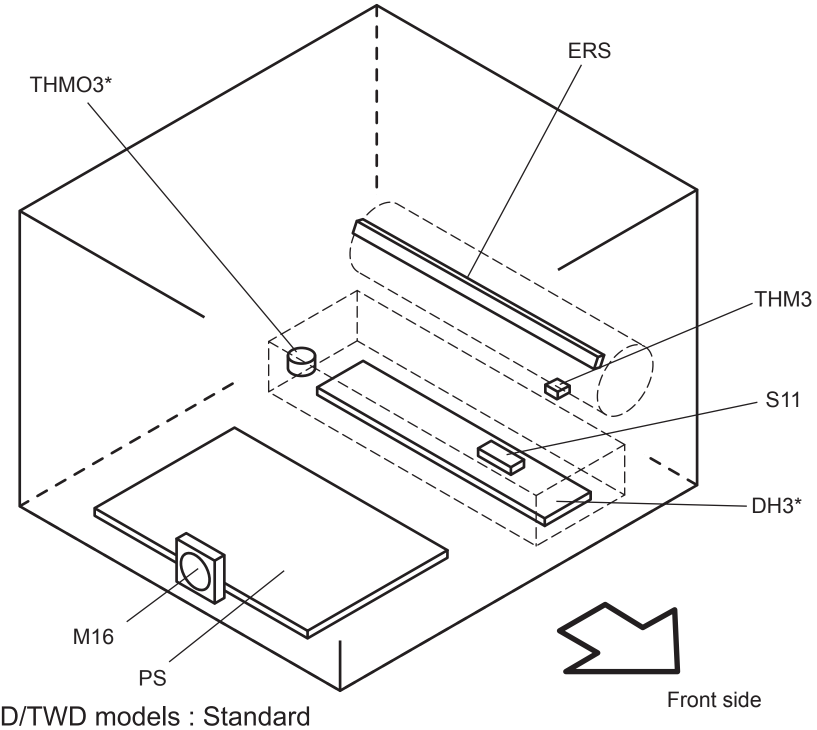

S9
S8
S10
M8
LRL
S32
S31
S30
S12
M9
Front side

Fig. 2-205

(D-2) Motor, sensor, lamp, heater, thermistor, thermostat


ERS
THMO3*
THM3
S11
DH3*
M16
PS
Front side

* ASD/AUD/CND/SAD/TWD models : Standard
NAD/MJD models : Option

Fig. 2-206

[E] Laser unit

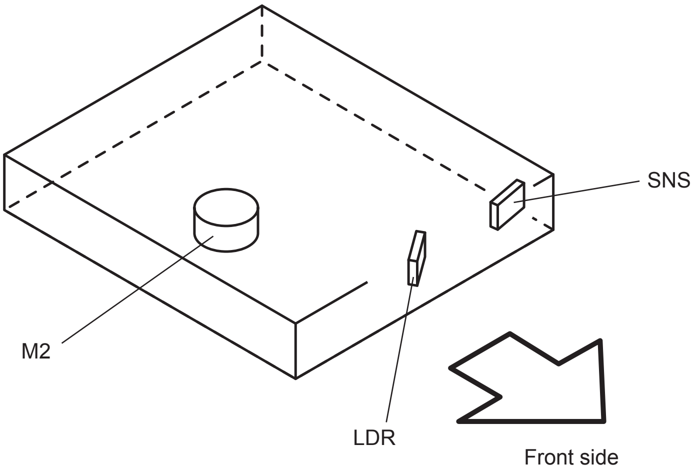

SNS
M2
LDR
Front side

Fig. 2-207

[F] Paper feeder unit

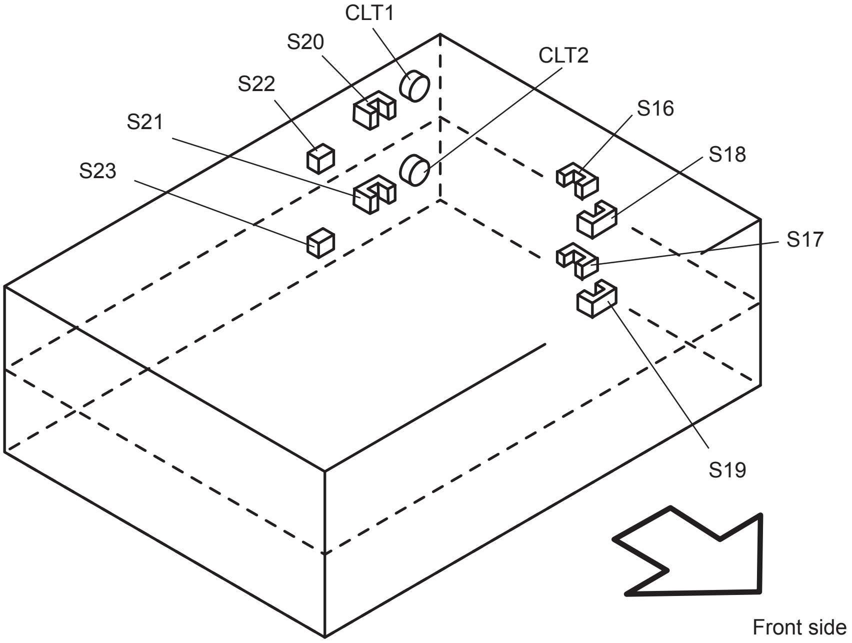

CLT1
S20
CLT2
S22
S16
S21
S18
S23
S17
S19
Front side

Fig. 2-208

[G] Transport unit

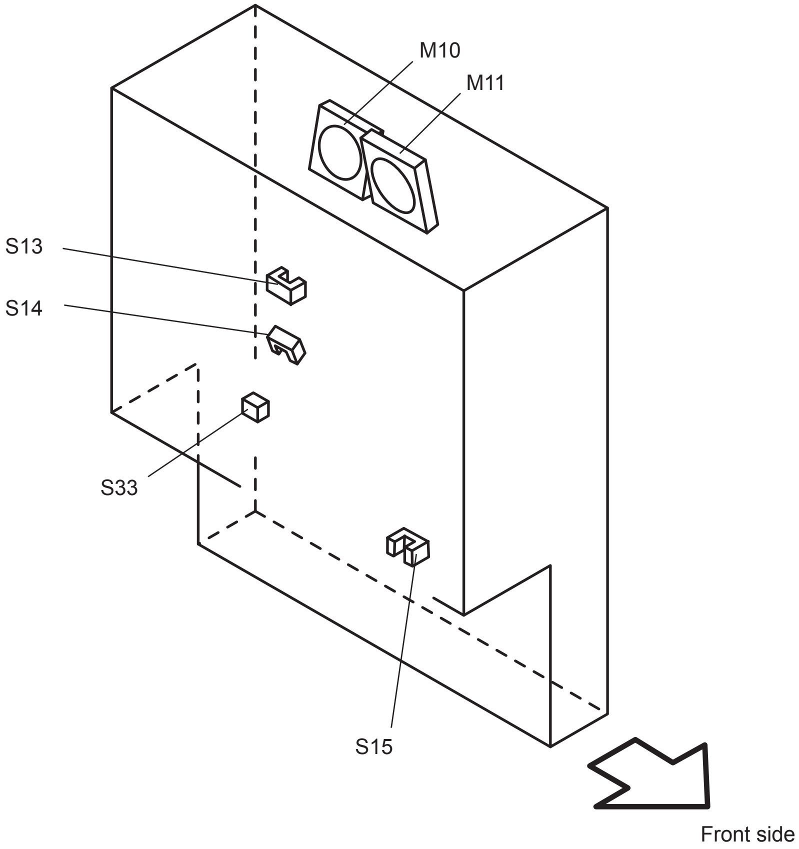

M10
M11
S13
S14
S33
S15
Front side

Fig. 2-209

[H] Bypass unit

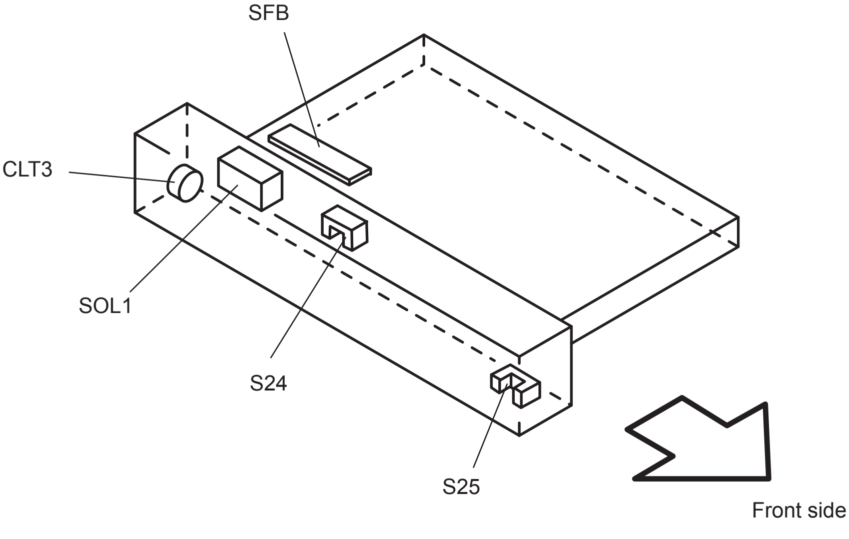

SFB
CLT3
SOL1
S24
S25
Front side

Fig. 2-210

[I] Automatic duplexing unit

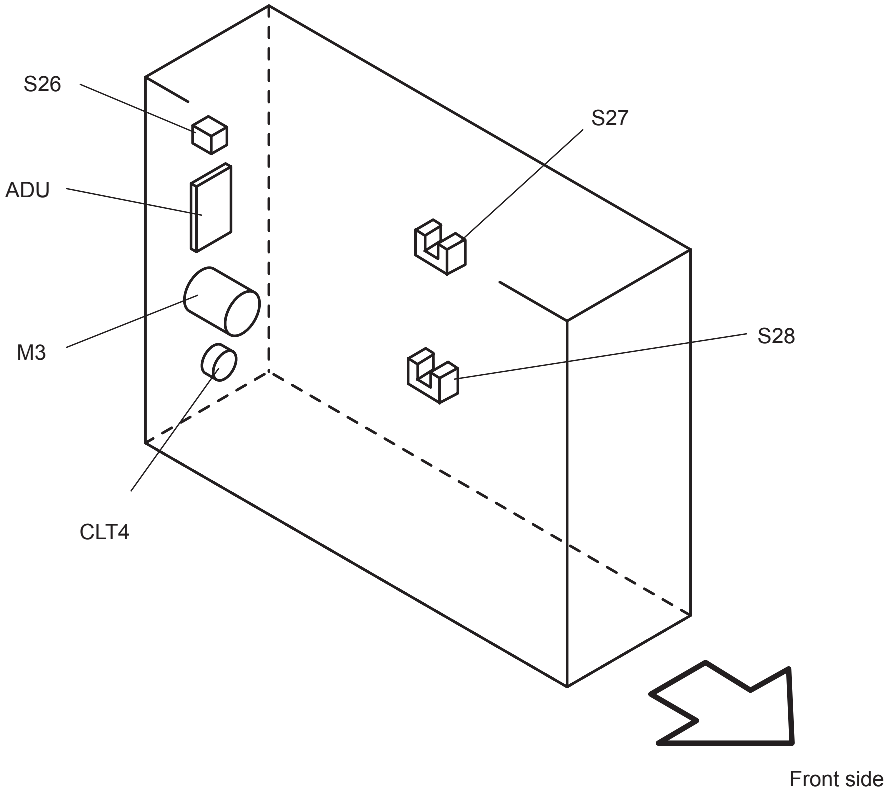

S26
ADU
M3
CLT4
S27
S28
Front side

Fig. 2-211

[J] Fuser unit

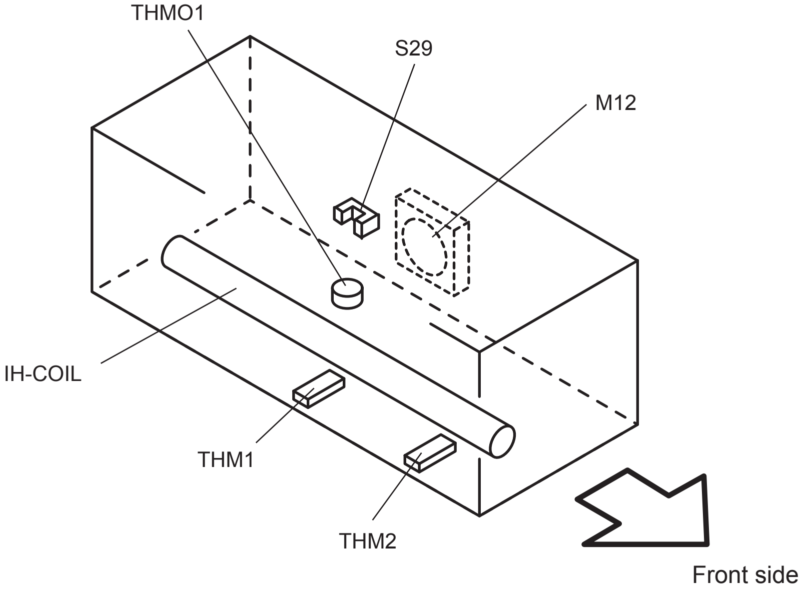

THMO1
S29
M12
IH-COIL
THM1
THM2
Front side

Fig. 2-212

[K] Drive unit

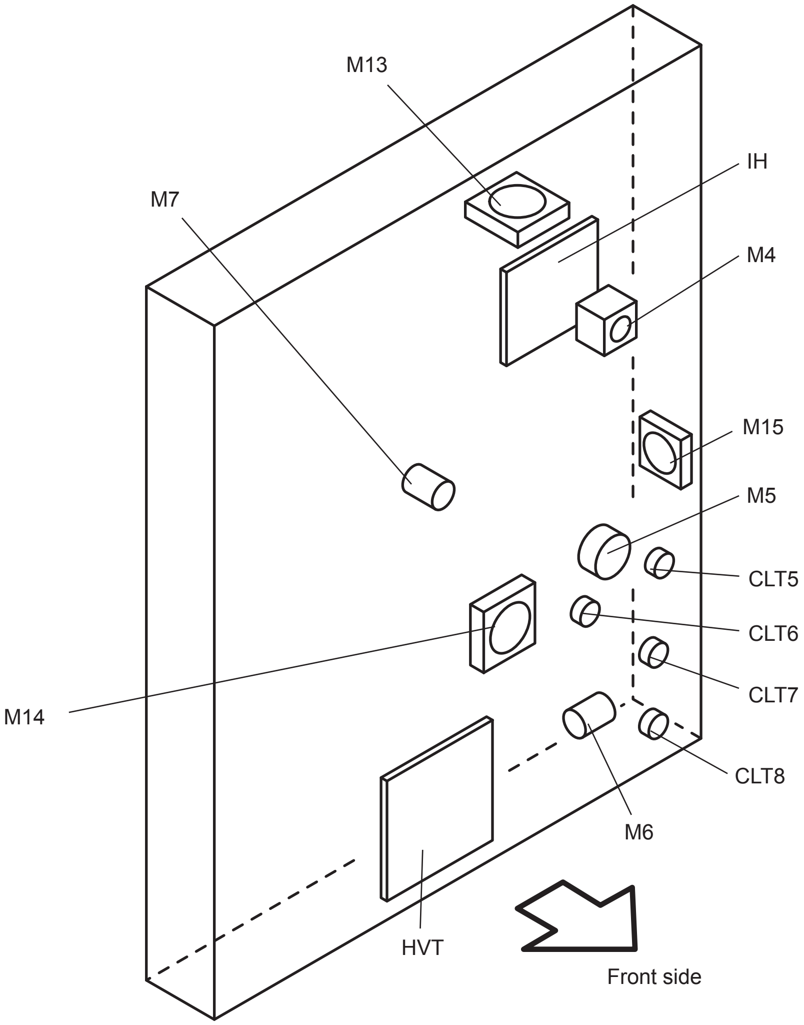
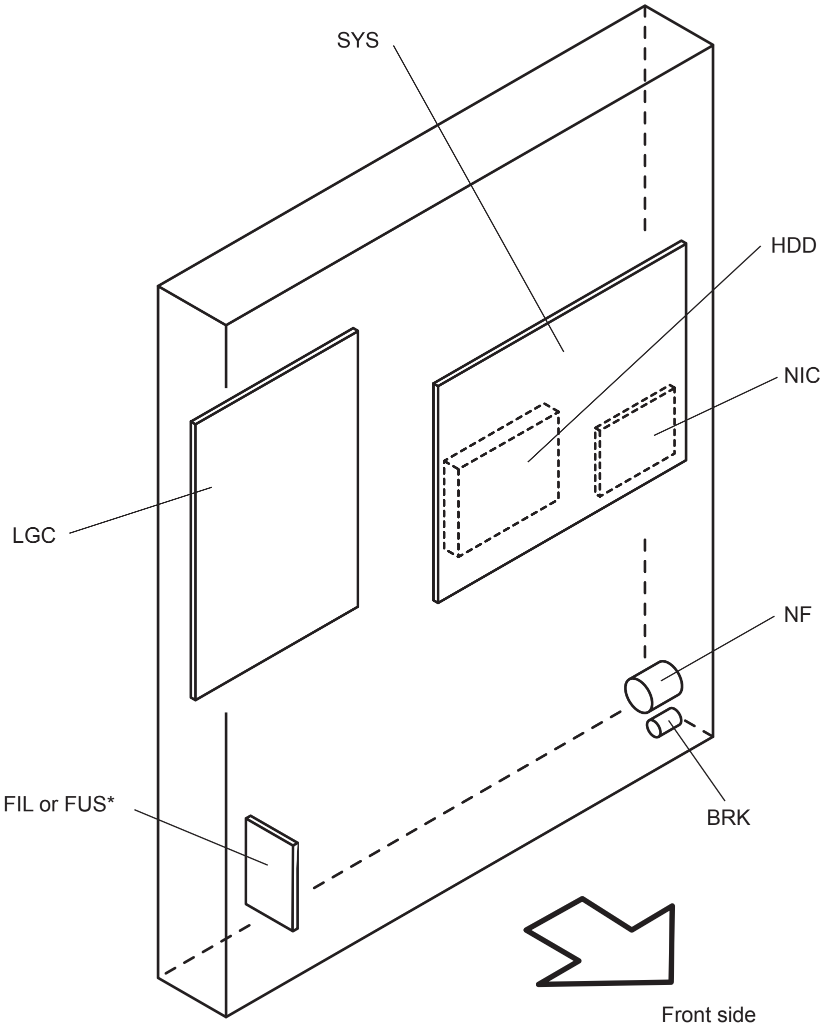

M13
IH
M7
M4
M15
M5
CLT5
CLT6
M14
CLT7
CLT8
M6
HVT
Front side

Fig. 2-213

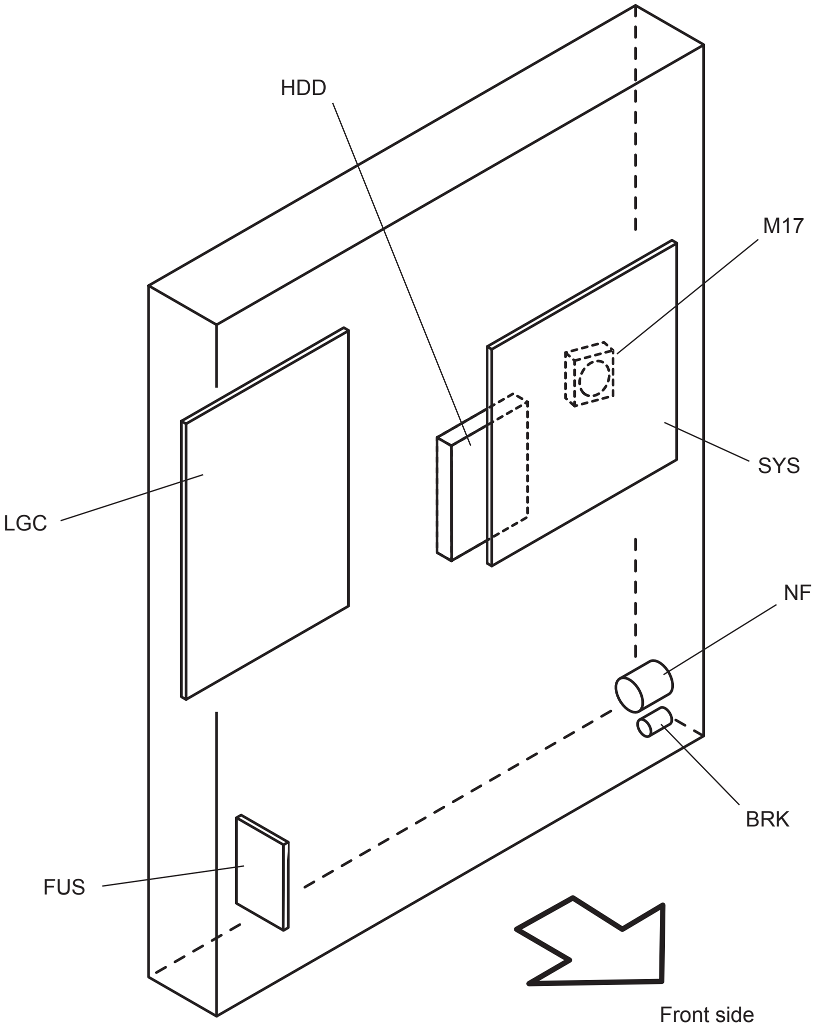
[L] PC board unit

e-STUDIO350/450


SYS
HDD
NIC
LGC
NF
FIL or FUS*
BRK
Front side

* NAD/SAD/TWD models : FIL (Standard)
ASD/AUD/CND models : FUS (Standard)
MJD model : FUS (Option)

Fig. 2-214


HDD
M17
SYS
LGC
NF
BRK
FUS
Front side

* NAD/SAD/TWD models : FIL (Standard)
ASD/AUD/CND models : FUS (Standard)
MJD model : FUS (Option)

Fig. 2-215

2.3 Symbols and Functions of Various Components

The column "P-I" shows the page and item number in the parts list.

(1) Motors

Symbol	Name	Function	Remarks	P- I
M1	SCAN-MOT Scan motor	Driving the carriages	B-1	P13 - I8
M2	M/DC-POL Polygonal motor	Driving the polygonal mirror	E	P9 - I5
M3	ADU-MOT ADU motor	Driving the automatic duplexing unit	I	P32 - I18
M4	EXIT-MOT Exit motor	Driving the exit roller	K	P6 - I20
M5	MAIN-MOT Main motor	Driving the drum, developer unit, fuser unit, registration roller, transport rollers, feed rollers and pickup rollers	K	P12 - I26
M6	TRY-MOT Tray-up motor	Driving the lifting movement of trays in upper/lower drawer	K	P4 - I26
M7	TNR-MOT Toner motor	Supplying the toner	K	P28 - I9
M8	LSU-FAN-MOT Laser unit cooling fan	Cooling down the laser unit	D-1	P9 - I3
M9	MID-FAN-MOT Middle fan	Cooling down the inside of the equipment	D-1	P9 - I3
M10	EXIT-FAN-MOT Exhaust fan	Exhausting ozone	G	P11 - I2
M11	SP-FAN-MOT Sub-separation fan	Assisting the paper separation process (Absorbing the paper from the drum)	G	P11 - I2
M12	FUS-FAN-MOT Fuser unit cooling fan	Cooling down the fuser unit	J	P30 - I13
M13	IH-FAN-MOT IH board cooling fan	Cooling down the IH board	K	P7 - I12
M14	DEV-FAN-MOT1 Developer unit cooling fan-1	Cooling down the developer unit	K	P6 - I18
M15	DEV-FAN-MOT2 Developer unit cooling fan-2	Cooling down the developer unit	K	P6 - I39
M16	PS-FAN-MOT Power supply cooling fan	Cooling down the power supply unit	D-2	P9 - I7
M17	HDD-FAN-MOT HDD cooling fan	Cooling down the HDD and SYS board * e-STUDIO352/353/452/453 only	L	P7 - I16

(2) Sensors and switches

Symbol	Name	Function	Remarks	P-I
S1-5	APS1-3, APS-C, APS-R Automatic original detection sensor	Original size detection	B-1	S1-4:P10 - I12
S6	HOME-SNR Carriage home position sensor	Carriage home position detection	B-1	P10 - I17
S7	PLTN-SNR Platen sensor	Opening/closing detection of platen cover or RADF	B-1	P13 - I10
S8	TNR-SW Toner cartridge switch	Toner cartridge presence/absence detection	D-1	P28 - I23
S9	USD-TNR-FLL-SNR1 Toner bag full detection sensor-1	Detecting if the used toner is full in the toner bag	D-1	P12 - I28
S10	USD-TNR-FLL-SNR2 Toner bag full detection sensor-2	Detecting the presence/absence of the toner bag Used toner amount defection in the toner bag	D-1	P25 - I59
S11	ATTNR-SNR Auto-toner sensor	Detecting the density of toner in the developer unit	D-2	P26 - I19
S12	TEMP/HUMI-SNR Temperature/humidity sensor	Detecting the temperature and humidity inside of the equipment	D-1	P5 - I15
S13	RGST-SNR Registration sensor	Detecting the paper transport at the registration roller section	G	P19 - I11
S14	FED-U-SNR Upper drawer feed sensor	Detecting paper jam and paper transport at upper drawer feeding section	G	P19 - I11
S15	FED-L-SNR Lower drawer feed sensor	Detecting paper jam and paper transport at lower drawer feeding section	G	P19 - I5
S16	CST-U-TRY-SNR Upper drawer tray-up sensor	Position detection of the lifting tray of the upper drawer	F	P14 - I30
S17	CST-L-TRY-SNR Lower drawer tray-up sensor	Position detection of the lifting tray of the lower drawer	F	P14 - I30
S18	EMP-U-SNR Upper drawer empty sensor	Paper presence/absence detection in the upper drawer	F	P14 - I30
S19	EMP-L-SNR Lower drawer empty sensor	Paper presence/absence detection in the lower drawer	F	P14 - I30
S20	NEMP-U-SNR Upper drawer paper stock sensor	Paper amount detection in the upper drawer	F	P14 - I30
S21	NEMP-L-SNR Lower drawer paper stock sensor	Paper amount detection in the lower drawer	F	P14 - I30

Symbol	Name	Function	Remarks	P-I
S22	CST-U-SW Upper drawer detection switch	Detecting presence/absence of the upper drawer	F	P4 - I101
S23	CST-L-SW Lower drawer detection switch	Detecting presence/absence of the lower drawer	F	P4 - I101
S24	SFB-SNR Bypass paper sensor	Detecting presence/absence of paper on the bypass tray	H	P18 - I5
S25	SFB-FED-SNR Bypass feed sensor	Detecting the transporting paper fed from the bypass tray	H	P18 - I5
S26	ADU-SET-SW ADU opening/closing switch	Automatic duplexing unit opening/ closing detection	I	P32 - I43
S27	ADU-TRU-SNR ADU entrance sensor	Detecting the transporting paper at automatic duplexing unit entrance section	I	P32 - I31
S28	ADU-TRL-SNR ADU exit sensor	Detecting the transporting paper in automatic duplexing unit	I	P32 - I31
S29	EXIT-SNR Exit sensor	Detecting the transporting paper at the exit section	J	P31 - I21
S30	MAIN-SW Main switch	Turning ON/OFF of the equipment	D-1	P5 - I10
S31	FRNT-COV-SW Front cover opening/closing switch	Detecting opening/closing of the front cover	D-1	P5 - I7
S32	COV-INTLCK-SW Cover opening/closing interlock switch	Controlling cutoff and supply of the 24V voltage by opening/closing of the front cover or jam access cover	D-1	P5 - I19
S33	SIDE-COV-SW Side cover opening/closing switch	Side cover opening/closing detection	G	P19 - I2

(3) Electromagnetic clutches

Symbol	Name	Function	Remarks	P-I
CLT1	CST-U-FEED-CLT Upper drawer feed clutch	Driving the upper drawer pickup roller	F	P14 - I29
CLT2	CST-L-FEED-CLT Lower drawer feed clutch	Driving the lower drawer pickup roller	F	P14 - I29
CLT3	SFB-FEED-CLT Bypass feed clutch	Driving the bypass pickup roller and bypass feed roller	H	P17 - I20
CLT4	ADU-CLT ADU clutch	Driving the automatic duplexing unit	I	P32 - I16
CLT5	RGST-CLT Registration clutch	Driving the registration roller	K	P19 - I31
CLT6	DEV-CLK Developer drive clutch	Driving the magnetic roller of the developer unit	K	P12 - I36
CLT7	CST-TR-L-CLT Transport clutch (Low speed)	Driving the transport roller (Low speed)	K	P15 - I20
CLT8	CST-TR-H-CLT Transport clutch (High speed)	Driving the transport roller (High speed)	K	P15 - I16

(4) Solenoids

Symbol	Name	Function	Remarks	P-I
SOL1	SFB-SOL Bypass pickup solenoid	Driving the bypass pickup roller	H	P18 - I11

(5) PC boards

Symbol	Name	Function	Remarks	P-I
CCD	PWA-F-CCD CCD driving PC board (CCD board)	Controlling CCD and outputting the analog signal	B-2	P10 - I10
SLG	PWA-F-SLG Scanning section control PC board (SLG board)	Controlling the original scanning section and RADF	B-2	P10 - I38
DSP	PWA-F-DSP Display PC board (DSP board)	Controlling LCD and the touch panel on the control panel	C	P3 - I26
KEY	PWA-F-KEY Key control PC board (KEY board)	Detecting the button entry and controlling LED on the control panel	C	P3 - I25
LRL	PWA-F-LRL Laser control signal relay PC board (LRL board)	Relaying the control signals of the laser unit	D-1	P9 - I23
LDR	PWA-F-LDR Laser driving PC board (LDR board)	Driving the laser diode	E	P9 - I5
SNS	PWA-F-SNS H-sync signal detection PC board (SNS board)	Detection of the laser beam position	E	P9 - I5
SFB	PWA-F-SFB Bypass tray slide guide width detection PC board (SFB board)	Detection of the bypass tray slide guide width	H	P16 - I13
ADU	PWA-F-ADU ADU driving PC board (ADU board)	Controlling the automatic duplexing unit	I	P32 - I30
IH	PS-IH IH control PC board (IH board)	Controlling each IH coil in the fuser unit	K	P7 - I2
SYS	PWA-F-SYS System control PC board (SYS board)	Controlling the whole system and image processing	L	P7 - I34/ P7-I7
LGC	PWA-F-LGC Logic PC board (LGC board)	Controlling the print engine section	L	P8 - I7
NIC	PWA-F-NIC NIC board	Network connection interface * e-STUDIO350/450 only	L	P7 - I22
FIL	PWA-F-FIL Filter PC board (FIL board)	Cutting noise of the AC power Power supplying to each damp heater * NAD/SAD/TWD models: Standard	L	P6 - I24
FUS	PWA-F-FUS Fuse PC board (FUS board)	Supplying the power to each damp heater * ASD/AUD/CND models: Standard * MJD model: Option	L	P6 - I24

(6) Lamps and heaters

Symbol	Name	Function	Remarks	P-I
EXP	LP-EXPO Exposure lamp	Exposing the original to the light	B-1	P21 - I6
ERS	LP-ERS Discharge LED	Removing the residual charge from the drum surface	D-2	P25 - I33
IH-COIL	IH-COIL IH coil	Heating the fuser roller	J	P31 - I23
DH1	SCN-L-DH Scanner damp heater (Left)	Preventing condensation of the mirrors of the carriages * ASD/AUD/CND/SAD/TWD models: Standard * NAD/MJD models: Option	B-2	P10 - I22
DH2	SCN-R-DH Scanner damp heater (Right)	Preventing condensation of the lens * ASD/AUD/CND/SAD/TWD models: Standard * NAD/MJD models: Option	B-2	P10 - I32
DH3	DRM-DH Drum damp heater	Preventing condensation of the drum * ASD/AUD/CND/SAD/TWD models: Standard * NAD/MJD models: Option	D-2	P27 - I7

(7) Thermistors and thermostats

Symbol	Name	Function	Remarks	P-I
THM1	THMS-C-HTR Main thermistor	Detecting the surface temperature at the center part of the fuser roller	J	P29 - I10
THM2	THMS-S-HTR Edge thermistor	Detecting the surface temperature at the edge of the fuser roller	J	P29 - I10
THM3	THMS-DRM Drum thermistor	Detecting the temperature at the drum surface	D-2	P26 - I29
THMO1	THERMO-FSR Fuser thermostat	Preventing overheating in the fuser unit	J	P29 - I9
THMO2	THERMO-SCN-DH Scanner damp heater thermostat	Controlling the temperature of the scanner damp heater	B-2	P10 - I22
THMO3	THERMO-DRM-DH Drum damp heater thermostat	Controlling the temperature of the drum damp heater	D-2	P27 - I7

(8) Transformer

Symbol	Name	Function	Remarks	P-I
HVT	PS-HVT High-voltage transformer	Generating high-voltage and supplying it to the following sections • Main charger wire • Main charger grid • Developer bias • Transfer bias • Separation bias	K	P4 - I29

(9) Others

Symbol	Name	Function	Remarks	P-I
INV	INV-EXP Inverter board	Controlling the exposure lamp	B-2	P21 - I7
LCD	LCD LCD panel	Displaying and entering each information	C	P3 - I19
PS	PS-ACC Switching power supply	Generating DC voltage and supplying it to each section of the equipment	D-2	P9 - I7
HDD	HDD Hard disk	Storing the program data and image data	L	P7 - I25/ P7-I103
NF	NS-FIL Noise filter	Cutting noise of AC power	L	P6 - I13
BRK	BREAKER Breaker	Preventing the inflow of overcurrent to the equipment	L	P6 - I14

2.4 General Description

2.4.1 System block diagram

(1) e-STUDIO350/450

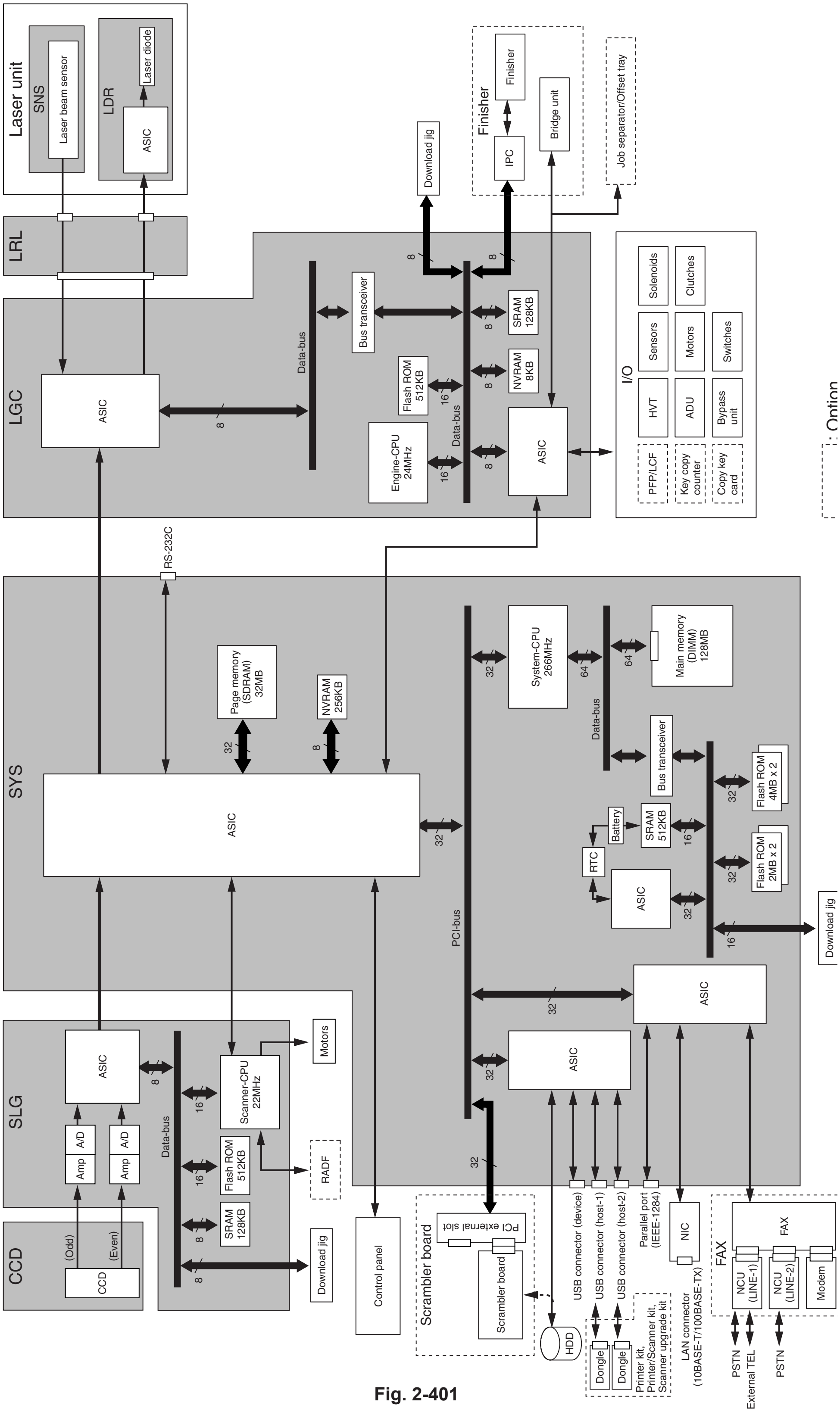

Laser unit
SNS
Laser beam sensor
LDR
Laser diode
ASIC
LRL
LGC
ASIC
8
Data-bus
Bus transceiver
8
8
Download jig
Finisher
IPC
Finisher
Bridge unit
Job separator/Offset tray
SRAM 128KB
8
NVRAM 8KB
8
Flash ROM 512KB
16
Engine-CPU 24MHz
16
Data-bus
8
ASIC
I/O
Solenoids
Clutches
Sensors
Motors
Switches
HVT
ADU
Bypass unit
PFP/LCF
Key copy counter
Copy key card
: Option
RS-232C
SYS
Page memory (SDRAM) 32MB
32
NVRAM 256KB
8
ASIC
32
PCI-bus
32
System-CPU 266MHz
64
Data-bus
64
Main memory (DIMM) 128MB
Bus transceiver
Flash ROM 4MB x 2
32
Battery
SRAM 512KB
16
RTC
Flash ROM 2MB x 2
32
ASIC
32
16
Download jig
32
ASIC
32
ASIC
32
SLG
ASIC
8
Data-bus
16
Scanner-CPU 22MHz
Motors
A/D
Amp
A/D
Amp
Flash ROM 512KB
16
RADF
SRAM 128KB
8
8
Download jig
CCD
(Odd)
(Even)
CCD
Control panel
Scrambler board
PCI external slot
Scrambler board
HDD
USB connector (device)
USB connector (host-1)
USB connector (host-2)
Parallel port (IEEE-1284)
NIC
Dongle
Dongle
Printer kit, Printer/Scanner kit, Scanner upgrade kit
LAN connector (10BASE-T/100BASE-TX)
FAX
FAX
NCU (LINE-1)
NCU (LINE-2)
Modem
PSTN
External TEL
PSTN

Fig. 2-401

(2) e-STUDIO352/353/452/453

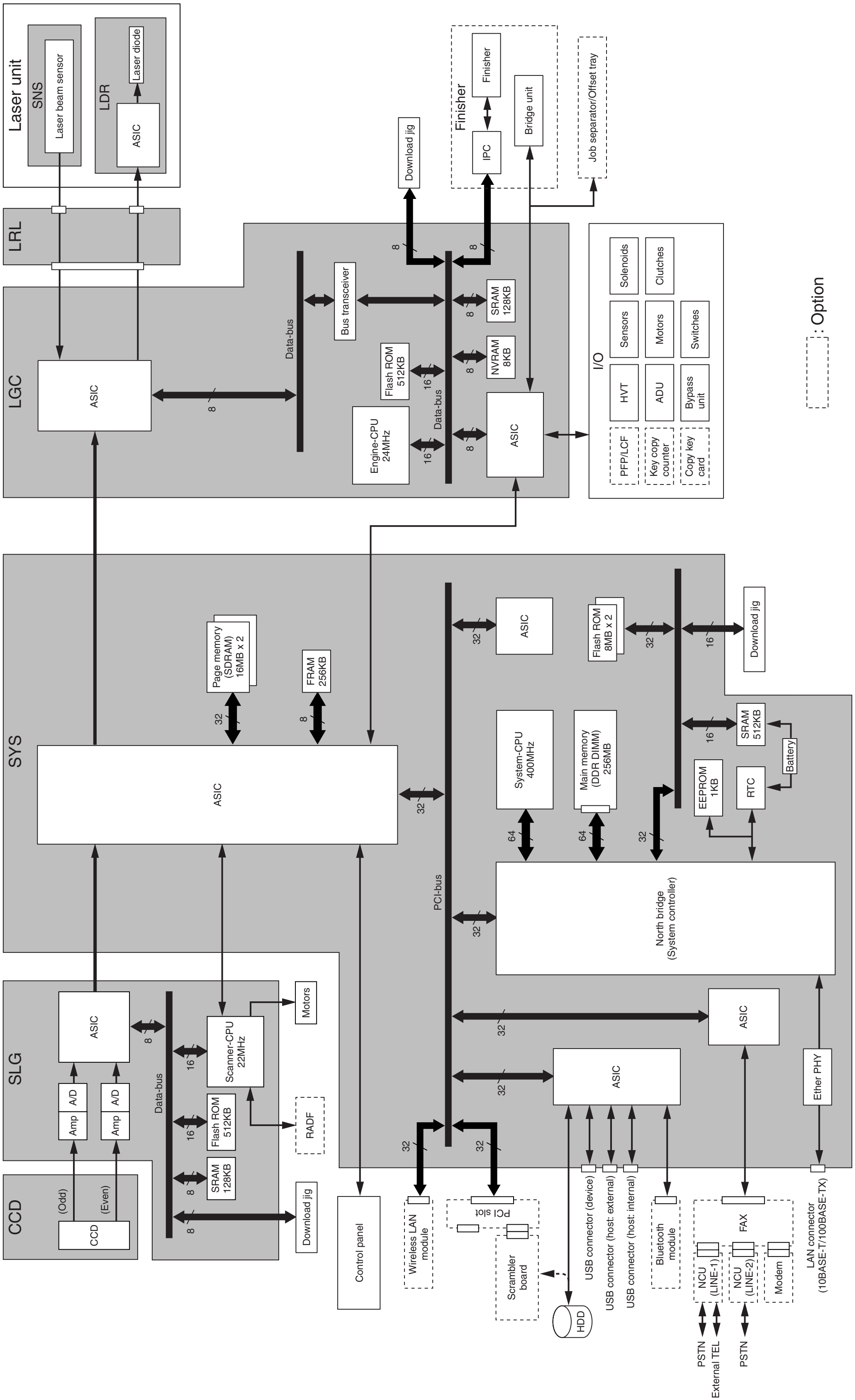

Laser unit
SNS
Laser beam sensor
LDR
Laser diode
ASIC
LRL
LGC
ASIC
8
Data-bus
Bus transceiver
Flash ROM 512KB
16
Engine-CPU 24MHz
16
Data-bus
8
8
SRAM 128KB
8
NVRAM 8KB
8
ASIC
Download jig
Finisher
IPC
Finisher
Bridge unit
Job separator/Offset tray
I/O
Solenoids
Clutches
Sensors
Motors
Switches
HVT
ADU
Bypass unit
PFP/LCF
Key copy counter
Copy key card
: Option
SYS
Page memory (SDRAM) 16MB x 2
32
FRAM 256KB
8
ASIC
32
PCI-bus
ASIC
32
Flash ROM 8MB x 2
32
16
Download jig
System-CPU 400MHz
Main memory (DDR DIMM) 256MB
64
64
32
SRAM 512KB
16
Battery
EEPROM 1KB
RTC
North bridge (System controller)
32
ASIC
32
ASIC
32
Ether PHY
32
32
SLG
ASIC
8
Data-bus
Scanner-CPU 22MHz
16
Motors
Flash ROM 512KB
16
RADF
SRAM 128KB
8
8
Download jig
Amp
A/D
Amp
A/D
CCD
(Odd)
(Even)
CCD
Control panel
Wireless LAN module
PCI slot
Scrambler board
HDD
USB connector (device)
USB connector (host: external)
USB connector (host: internal)
Bluetooth module
FAX
NCU (LINE-1)
NCU (LINE-2)
Modem
PSTN
External TEL
PSTN
LAN connector (10BASE-T/100BASE-TX)

Fig. 2-402

2.4.2 Construction of boards

(a) Construction diagram of boards

This system consists of the following including the SYS board as a main board.

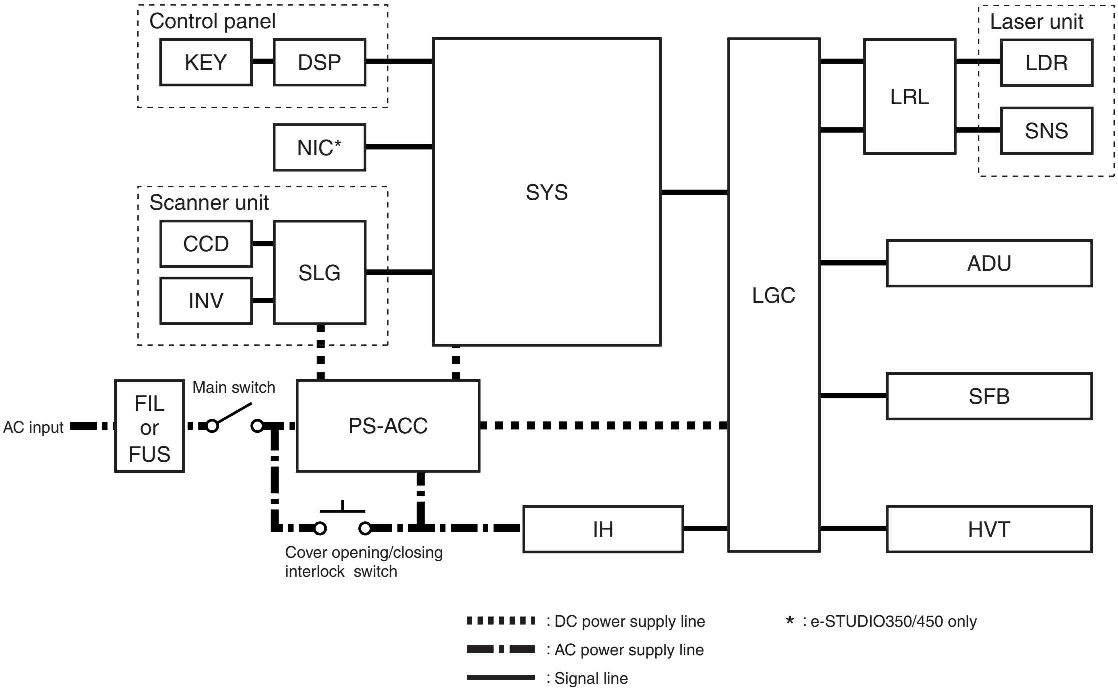

Control panel
KEY
DSP
NIC*
Scanner unit
CCD
SLG
INV
SYS
LGC
LRL
Laser unit
LDR
SNS
ADU
SFB
HVT
IH
AC input
FIL or FUS
Main switch
PS-ACC
Cover opening/closing interlock switch
: DC power supply line
: AC power supply line
: Signal line
* : e-STUDIO350/450 only

Fig. 2-402

(b) Function of each board

CCD board:
This is the board to convert the reflected light by the original to electrical signals. It consists of the CCD, and its peripheral circuitry. The CCD converts the reflected light by the original to analog signal and outputs it to the SLG board.

SLG board:
This is the board to mainly control the scanning function (scanner unit) and consists of the Scanner-CPU, ASIC, memory (Flash ROM and SRAM), A/D converter, driver for motor drive, etc. When scanning the original, the exposure lamp and scan motor are driven by the command from the Scanner-CPU. The analog signal output from the CCD board is then converted to digital signal by the A/D converter. Image processing is performed by ASIC.

INV board:
This is the board on which the lighting control circuit of the exposure lamp is mounted. The exposure lamp lights by the command from the Scanner-CPU.

DSP board:
This is the board to mainly control the control panel. The panel processing CPU detecting the input from each button and touch panel, and the lighting control circuit for the backlight of the LCD are mounted. And it relays the control signal of the control panel from the SYS board to the LCD and KEY board.

KEY board:
This is the board on which each button switch and each LED on the control panel are mounted.

LDR board:
This is the board on which the laser diode and the ASIC are mounted. The laser is emitted based on the output image data signal from the ASIC on the LGC board.

SNS board:
This is the board on which the light sensor for detecting the radiating position of the laser is mounted. It outputs the H-sync signal to ASIC on the LGC board.

LRL board:
This is the board to relay each signal transmitted between the LGC board and laser unit (LDR and SNS boards).

SFB board:
This is the board on which the circuit pattern is printed. It detects the position of the slide guide of the bypass unit.

ADU board:
This is the board to relay each signal between the ASIC on the LGC board and the electric parts (motor, sensor, clutch) in the ADU.

IH board:
This is the board to generate the electric power for driving the IH coil of the fuser unit from the AC electric power input via the switching power supply. And then it is provided.

SYS board:
This is the main board taking a leading part in all systems. It consists of the System-CPU, ASIC, memory (DIMM, SDRAM, Flash ROM, SRAM, NVRAM), RTC (Real Time Clock IC), etc. The System-CPU controls each ASIC to perform the control of the image processing, image memory (page memory, main memory, HDD), external interface (RS-232C, IEEE-1284, USB, PCI), NIC and FAX. Based on the input data from the control panel, the System-CPU communicates with the Scanner-CPU on the SLG board and Engine-CPU on the LGC board, and then issues an operation command to the scanner and printer engine section.

LGC board:
This is the board to mainly control the printing function (printer engine). It consists of the Engine-CPU, ASIC, memory (Flash ROM, SRAM, NVRAM), driver for motor drive, etc. The Engine-CPU controls each ASIC to drive I/O (for the electrical parts) of each section in the system. It leads to the operation of the laser unit, developer unit, drum, drawers, bypass unit, ADU, etc. Thus printing is performed.

NIC board (e-STUDIO350/450 only):
This is the interface board to connect this equipment to the LAN environment (10BASE-T, 100BASE-TX) to communicate with PCs, etc.

FIL board:
This is the board to cut off the noise of AC power from outside, and supply the driving AC power to the damp heater for condensation prevention of each section (scanner and drum).

FUS board:
This is the board to provide the AC electric power for driving to the damp heater for preventing of the condensation of each section (scanner and drum).

HVT:
This is the board to generate the DC high voltage from +24V to provide the bias to the section of the main charger, developer, transfer, and separation.

PS-ACC:
This is the unit to generate each DC voltage, which is used in the equipment, from external AC electric power input. And then it is provided to each electrical part.

2.5 Installation and Replacement of Covers and PC boards

2.5.1 External covers

[A] Front cover

(1) Open the front cover.

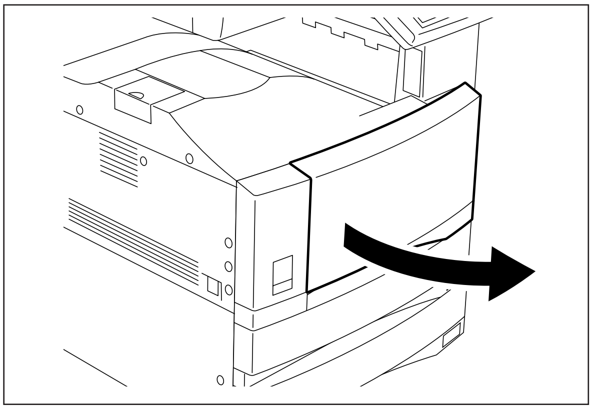


Fig. 2-501

(2) Remove the toner bag.

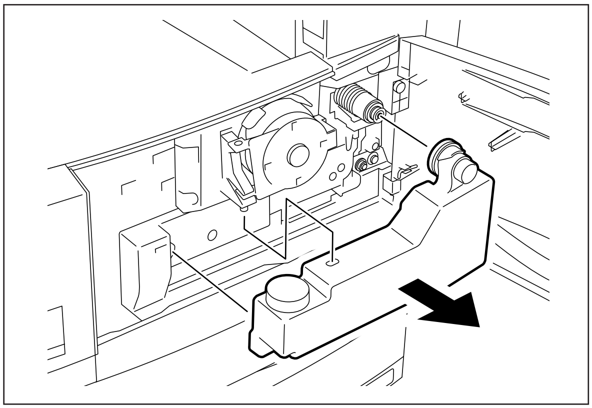


Fig. 2-502

(3) Pull up the hinge pin and extract it.

(4) Take off the front cover.

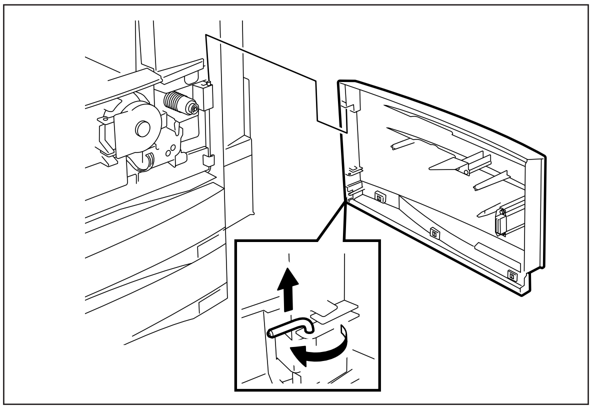


Fig. 2-503

[B] Front left cover

(1) Open the front cover.

(2) Remove 1 screw and front left cover.

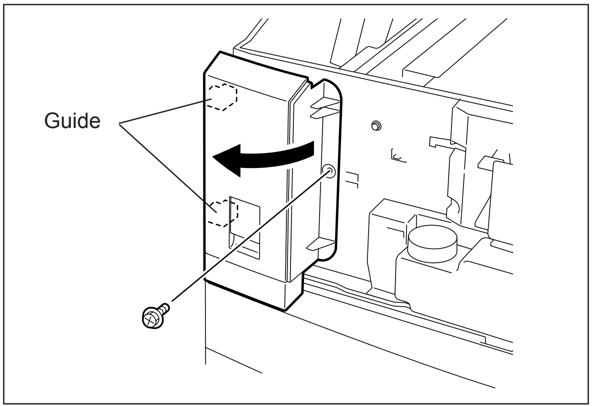


Fig. 2-504

[C] Rear cover

(C-1) e-STUDIO350/450

(1) Remove 7 screws and take off the rear cover.

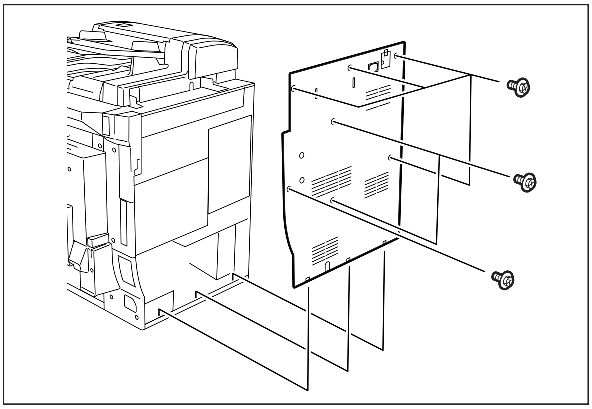


Fig. 2-505

(C-2) e-STUDIO352/353/452/453

(1) Remove 1 screw and take off the connector cover.

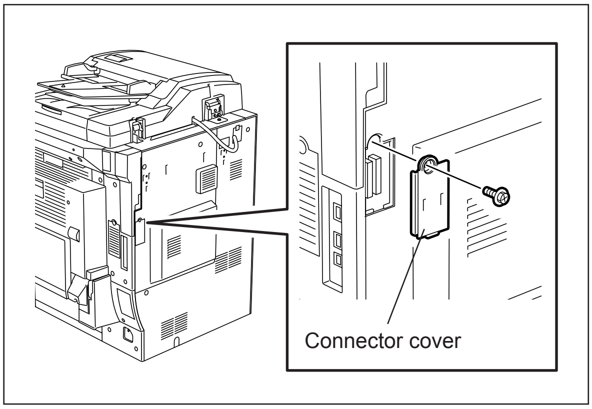


Fig. 2-506

(2) Remove 2 screws and take off the rear cover-1.

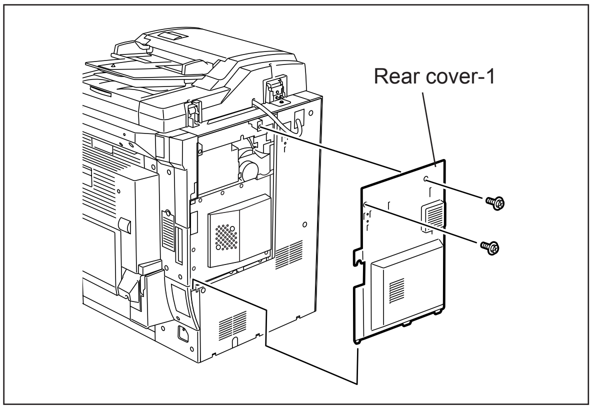


Fig. 2-507

(3) Remove 3 screws and take off the rear cover-2.

Note:
If the RADF has been installed, disconnect the connector of the RADF before the above step.

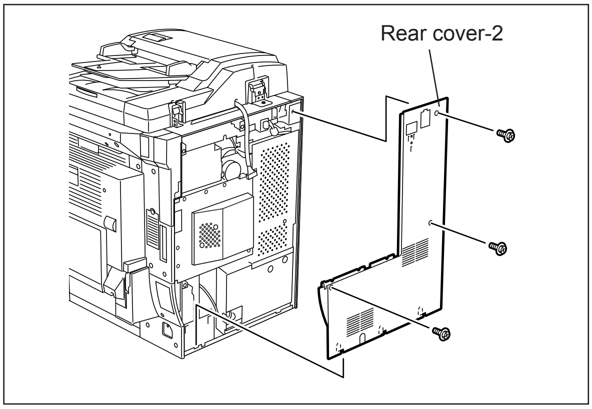


Fig. 2-508

[D] Left upper cover

(1) Remove 2 screws and take off the left upper cover.

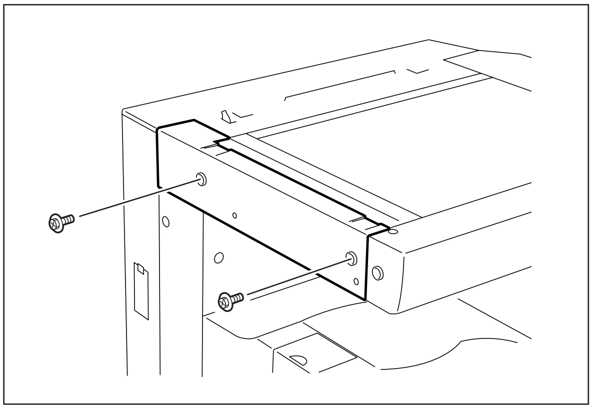


Fig. 2-509

[E] Front upper cover

(1) Take off the left upper cover (► Chapter 2.5.1 [D]).
(2) Remove 2 screws and take off the front upper cover.

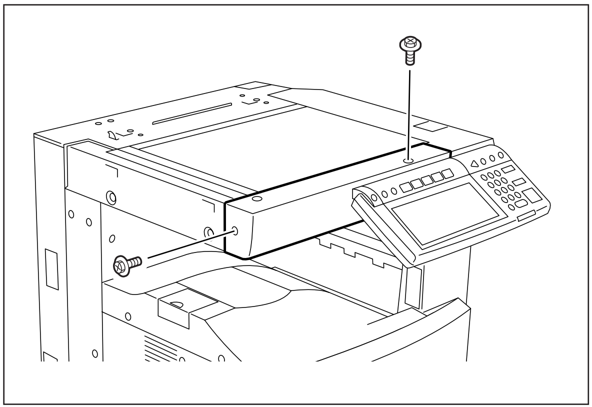


Fig. 2-510

[F] Right upper cover

(1) Remove 3 screws and take off the right upper cover.

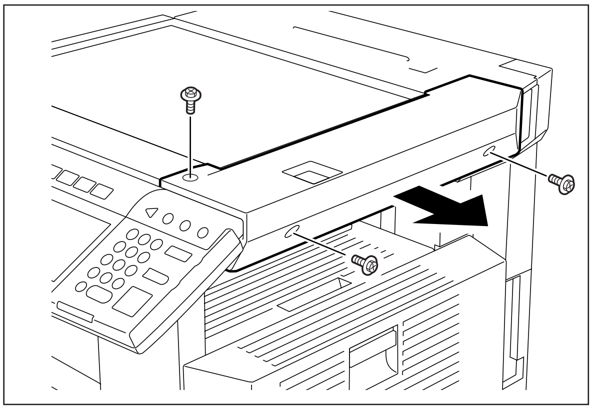


Fig. 2-511

[G] Upper rear cover

(1) Take off the RADF or platen cover.
(2) Take off the left upper cover (► Chapter 2.5.1 [D]).
(3) Take off the right upper cover (► Chapter 2.5.1 [F]).
(4) Remove 2 screws and upper rear cover.

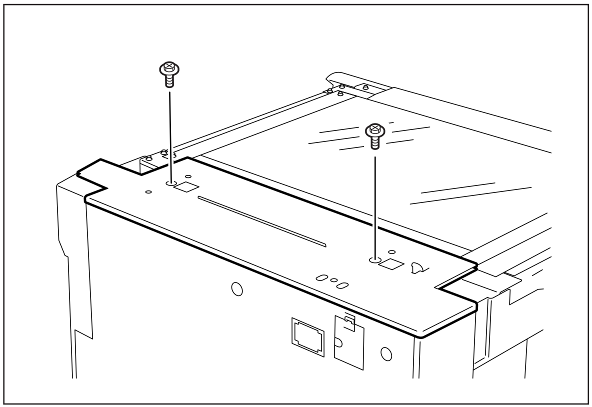


Fig. 2-512

[H] Receiving tray

(1) Remove 2 screws and take off the receiving tray.

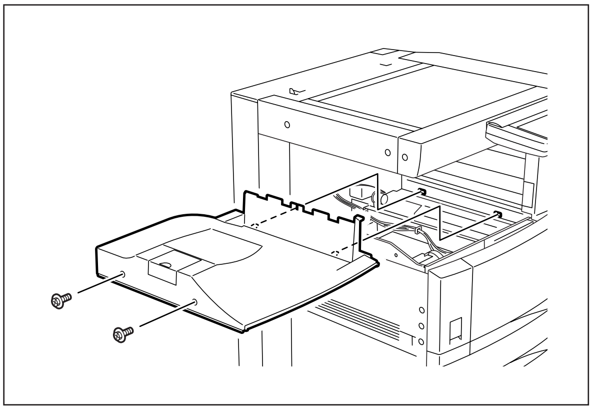


Fig. 2-513

[I] Tray back cover

(1) Take off the receiving tray (► Chapter 2.5.1 [H]).

(2) Take off the scan base cover.

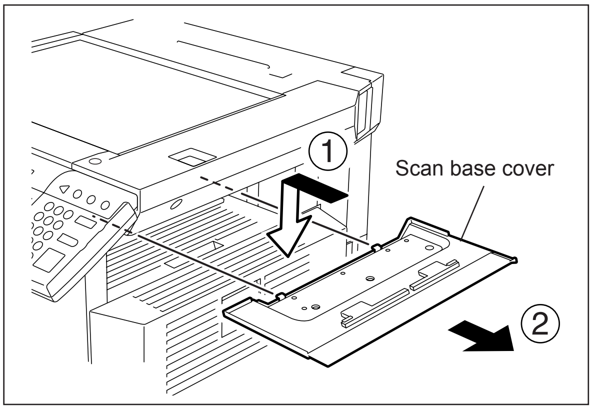


Fig. 2-514

(3) Remove 1 screw and take off the receiving tray back cover.

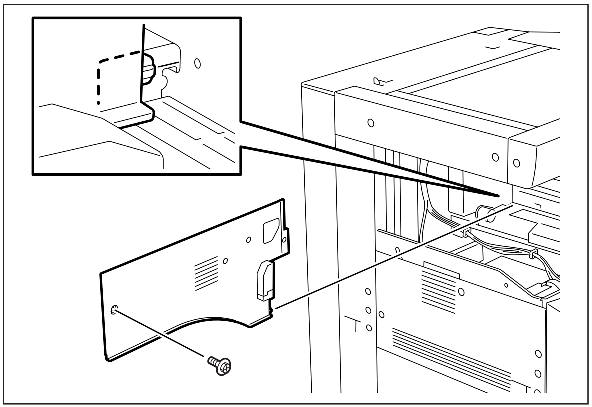


Fig. 2-515

[J] Left cover

(1) Remove 3 screws and take off the left cover.

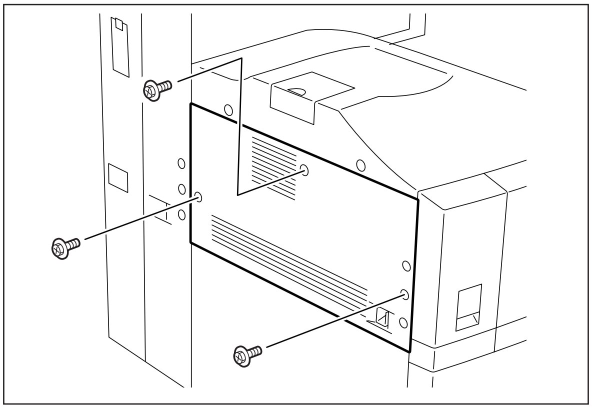


Fig. 2-516

[K] Left rear cover

(1) Take off the left upper cover (► Chapter 2.5.1 [D]).

(2) Remove 3 screws and take off the left rear cover.

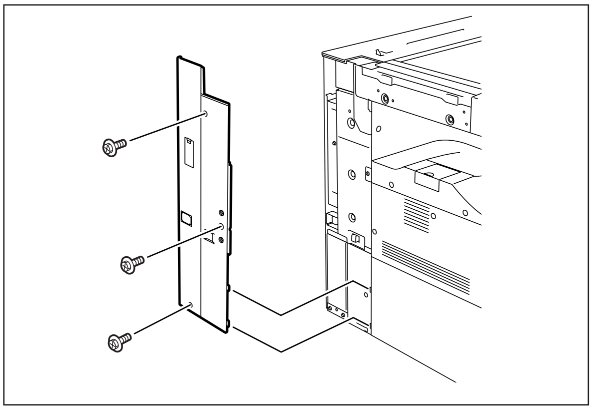


Fig. 2-517

[L] IH terminal cover

(1) Open the ADU, jam access cover and fuser unit cover.

(2) Remove 2 screws and take off the IH terminal cover.

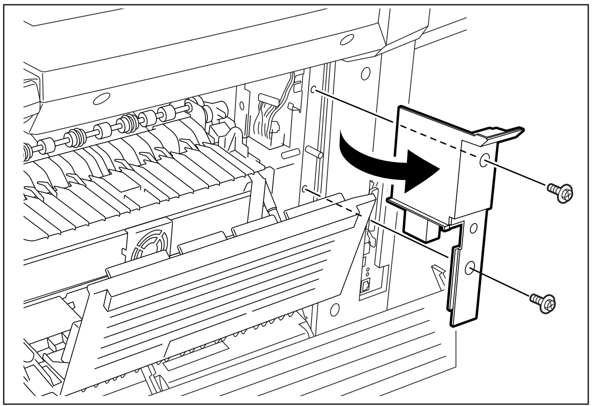


Fig. 2-518

[M] Right front hinge cover

(1) Pull out the upper and lower drawers.

(2) Remove 2 screws and take off the right front hinge cover.

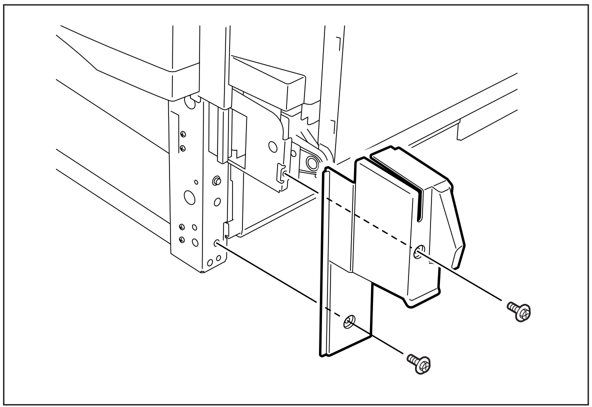


Fig. 2-519

[N] Right rear hinge cover

(1) Remove 2 screws and take off the right rear hinge cover.

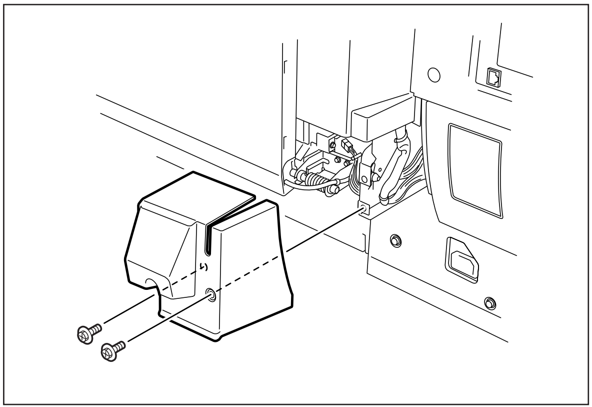


Fig. 2-520

[O] Right lower cover

(1) Take off the right rear hinge cover (► Chapter 2.5.1 [N]).

(2) Remove 2 screws and take off the right lower cover.

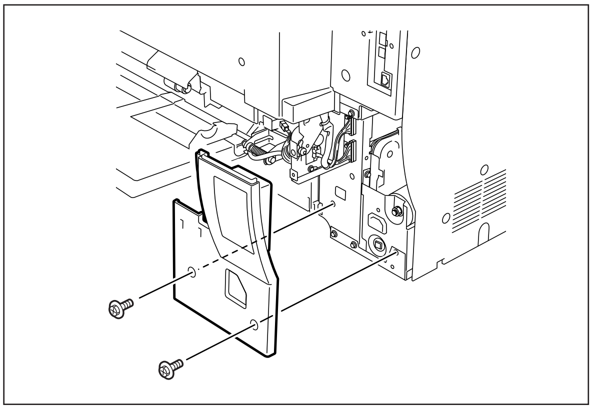


Fig. 2-521

[P] Right rear cover

(1) Take off the right upper cover (► Chapter 2.5.1 [F]).

(2) Take off the IH terminal cover (► Chapter 2.5.1 [L]).

(3) Take off the right rear hinge cover (► Chapter 2.5.1 [N]).

(4) Remove 2 screws and take off the right rear cover.

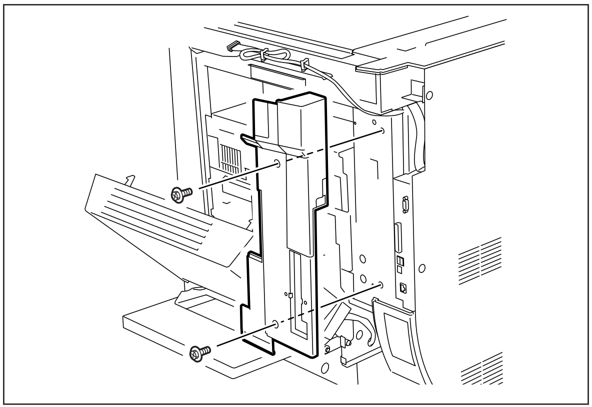


Fig. 2-522

[Q] Front right cover

(1) Take off the front cover (► Chapter 2.5.1 [A]).

(2) Take off the receiving tray (► Chapter 2.5.1 [H]).

(3) Take off the right upper cover (► Chapter 2.5.1 [F]).

(4) Take off the upper drawer. Open the bypass tray and ADU.

(5) Remove 2 screws and take off the front right cover.

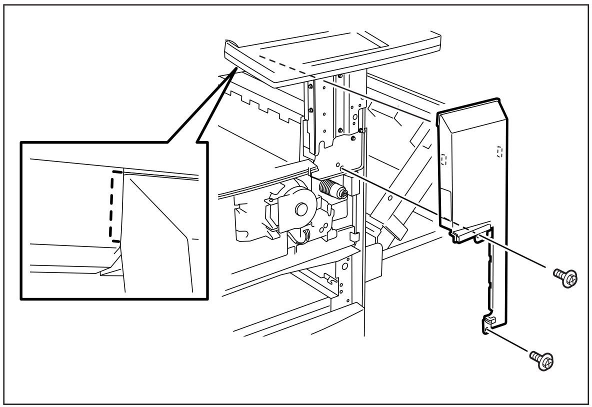


Fig. 2-523

2.5.2 PC boards

Note:

When the PC board/HDD is replaced, refer to each CAUTIONS of TROUBLESHOOTHING in the SERVICE HANDBOOK.

[A] Logic PC board (LGC board)

(A-1) LGC board

(1) Take off the rear cover (► Chapter 2.5.1 [C]).

(2) Loosen 8 screws and take off the LGC board cover.

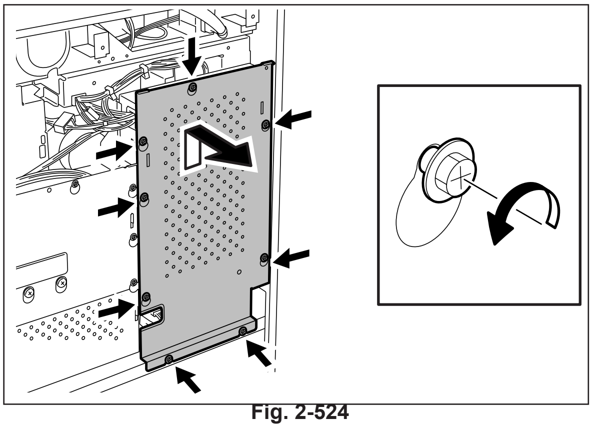


Fig. 2-524

(3) Disconnect 14 connectors and 1 connector with lock.

(4) Remove 4 screws and release 2 locking supports. Then take off the LGC board.

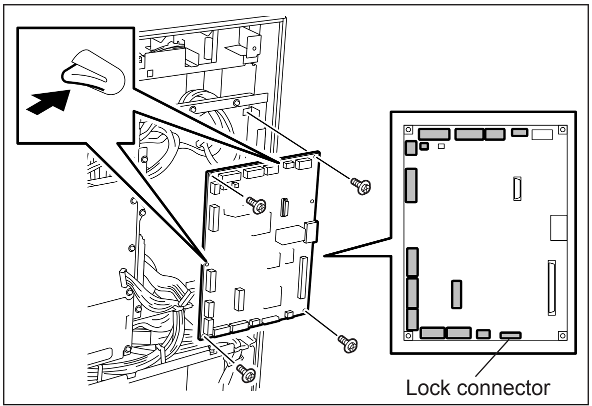


Fig. 2-525

(A-2) LGC board unit

(1) Take off the rear cover (► Chapter 2.5.1 [C]).

(2) Loosen 8 screws and take off the LGC board cover.

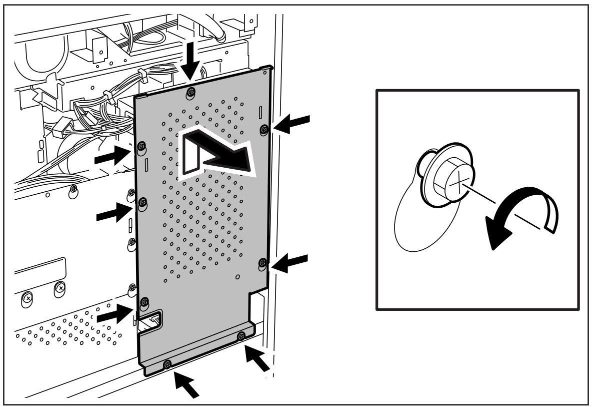


Fig. 2-526

(3) Disconnect 14 connectors, 1 connector with lock and 1 joint connector fixed to the case.

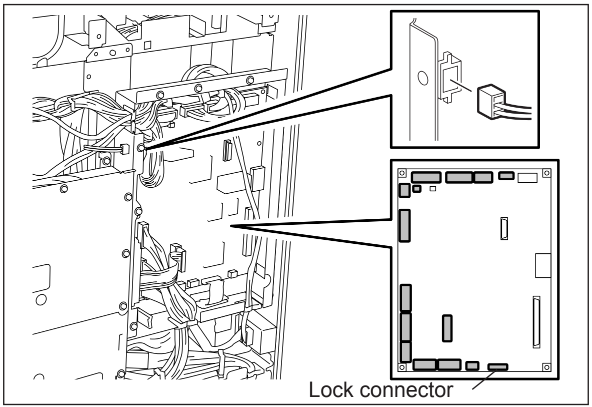


Fig. 2-527

(4) Release all the harnesses from the harness clamps and holders on the case.

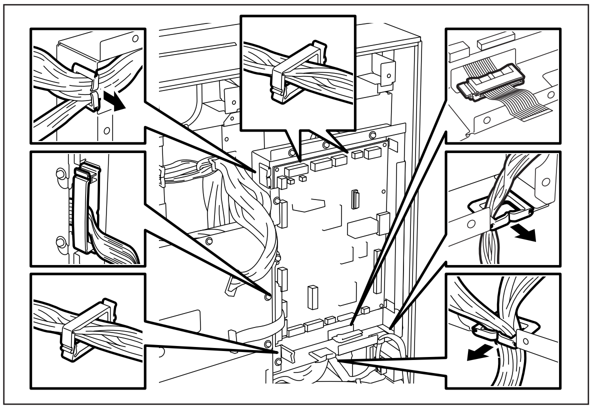


Fig. 2-528

(5) Remove 5 screws and take off the LGC board with the whole case.

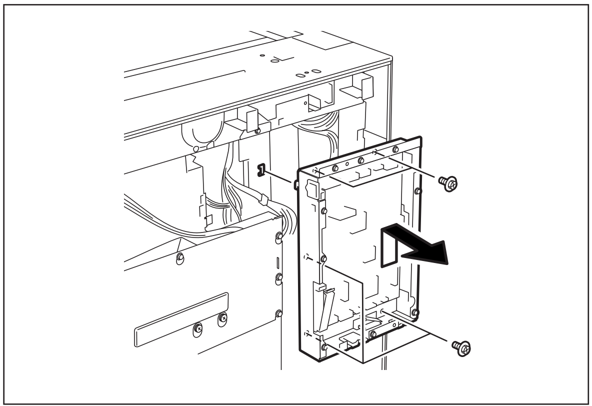


Fig. 2-529

[B] Hard disk / HDD cooling fan

(B-1) e-STUDIO350/450

(1) Take off the rear cover (► Chapter 2.5.1 [C]).

(2) Loosen 9 screws and take off the SYS board upper cover.

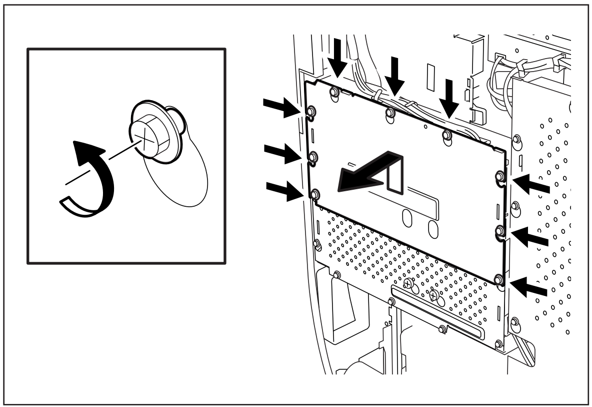


Fig. 2-530

(3) Disconnect 2 connectors.

(4) Loosen 5 screws and take off the hard disk with the whole SYS board lower cover.

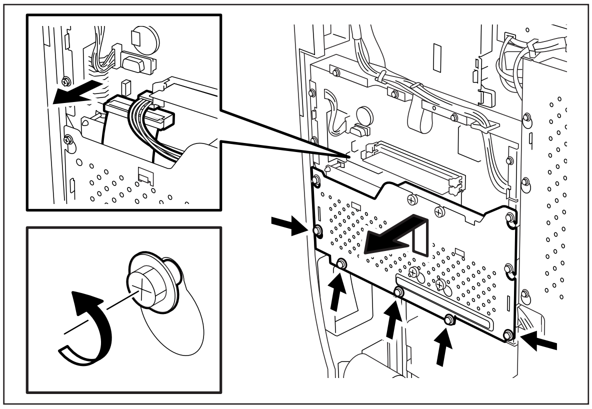


Fig. 2-531

(5) Remove 4 screws and take off the hard disk.

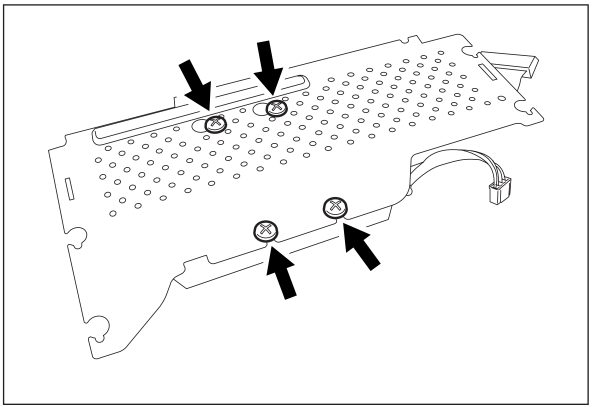


Fig. 2-532

(B-2) e-STUDIO352/353/452/453

(1) Take off the rear cover-1.
(► chapter 2.5.1[C])

(2) Disconnect 1 connector. Release the harness from harness clamps.

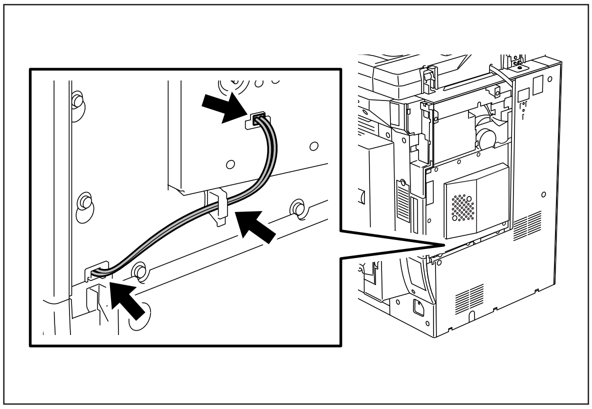


Fig. 2-533

(3) Loosen 10 screws and take off the SYS board cover.

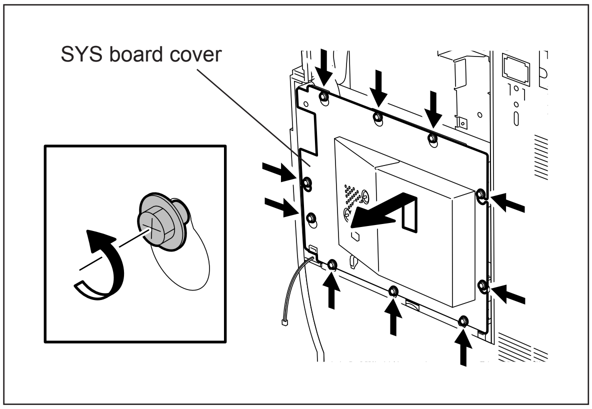


Fig. 2-534

(4) Disconnect 2 connectors.

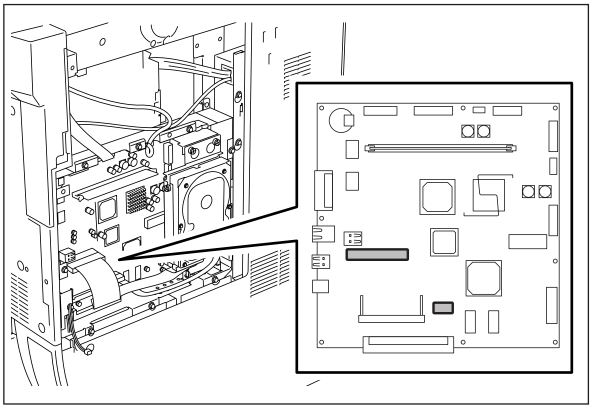


Fig. 2-535

(5) Remove 4 screws and take off the hard disk with the whole brackets.

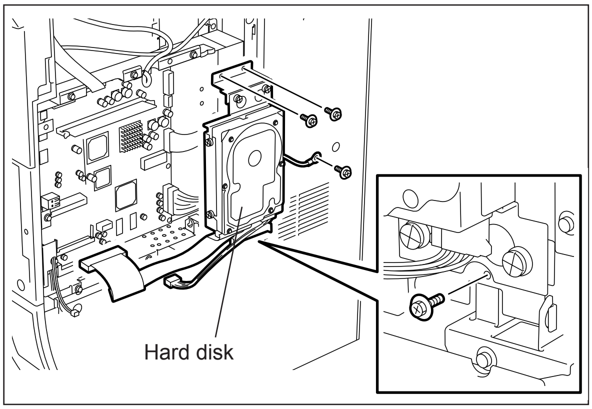


Fig. 2-536

(6) Remove 4 screws, disconnect 2 connectors and take off the hard disk. Remove 1 screw and take off the ground wire.

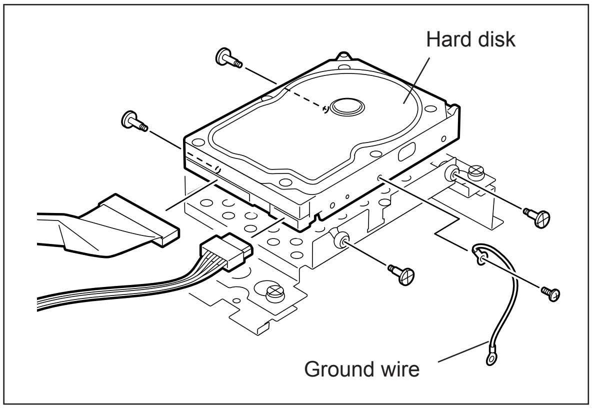


Fig. 2-537

(7) Remove 2 screws and take off the HDD cooling fan from the SYS board cover.

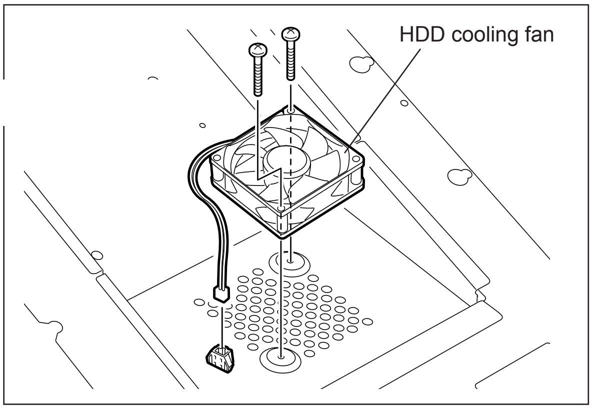


Fig. 2-538

[C] System control PC board case (SYS board case)

(C-1) e-STUDIO350/450

(1) Take off the rear cover (► Chapter 2.5.1 [C]).

(2) Take off the hard disk with the whole SYS board lower cover (► Chapter 2.5.2 [B]).

(3) Disconnect 4 connectors.

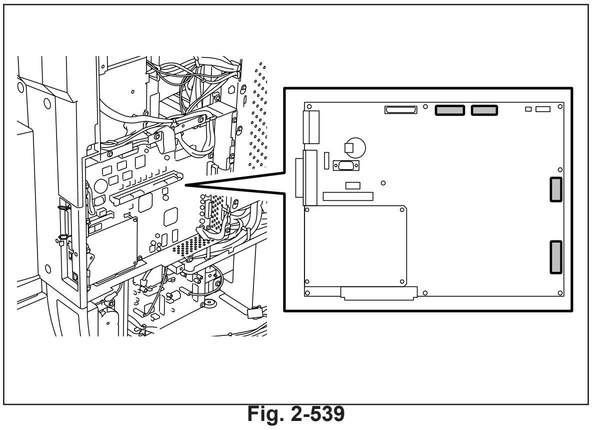


Fig. 2-539

(4) Release all the harnesses from harness clamps and holders on the case.

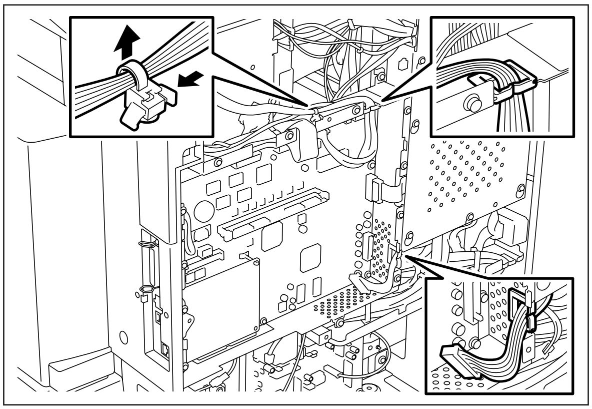


Fig. 2-540

(5) Remove 5 screws and take off the SYS board case.

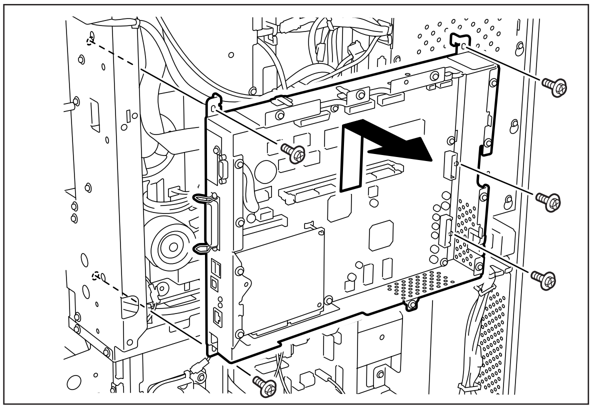


Fig. 2-541

(C-2) e-STUDIO352/353/452/453

(1) Take off the connector cover and rear cover-1. (► chapter 2.5.1 [C])
(2) Take off the hard disk with the whole brackets. (► chapter 2.5.2 [B])
(3) Disconnect 4 connectors.

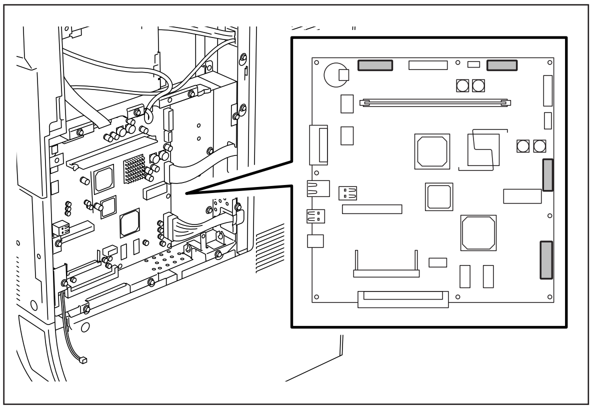


Fig. 2-542

(4) Release the harnesses from 2 harness clamps.

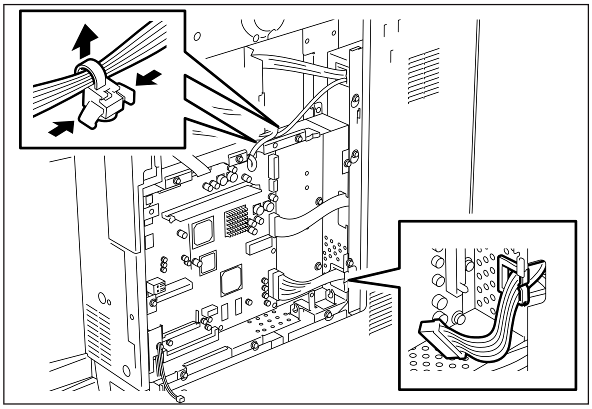


Fig. 2-543

(5) Remove 5 screws and take off the SYS board case.

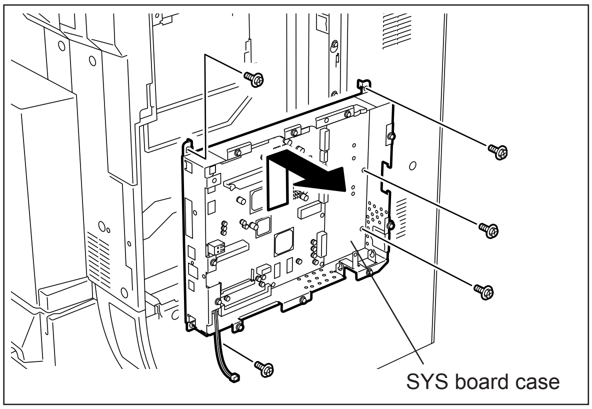


Fig. 2-544

[D] NIC board / System control PC board (SYS board)

(D-1) e-STUDIO350/450

(1) Take off the rear cover (► Chapter 2.5.1 [C]).
(2) Take off the hard disk with the whole SYS board lower cover (► Chapter 2.5.2 [B]).
(3) Disconnect 5 connectors.

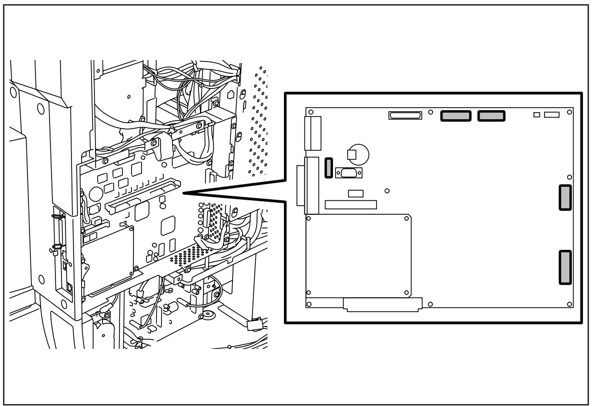


Fig. 2-545

(4) Remove 2 screws, release 1 lock support. Then take off the NIC board.

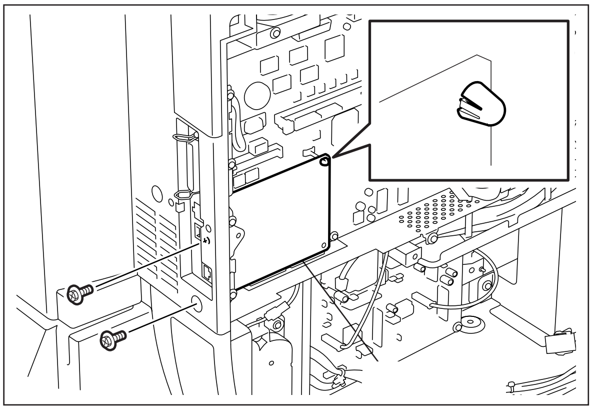


Fig. 2-546

(5) Remove 10 screws, take off the SYS board.

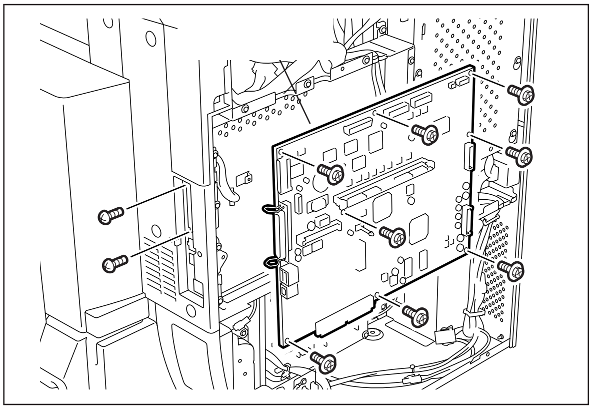


Fig. 2-547

(D-2) e-STUDIO352/353/452/453

(1) Take off the hard disk with the whole brackets. (► chapter 2.5.1 [B])

(2) Disconnect 4 connectors.

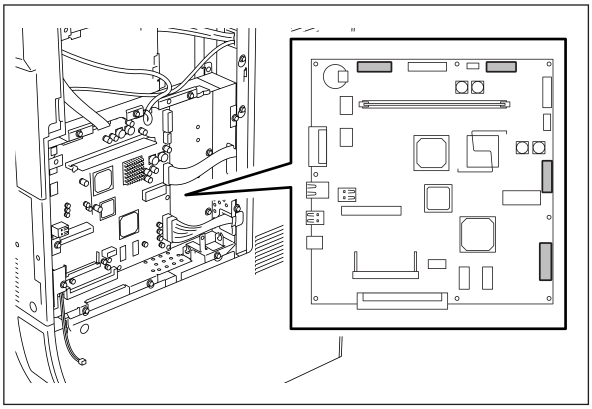


Fig. 2-548

Note:
Alternatively, you can take off the SYS board without removing the hard disk by removing 2 upper and 1 lower fixing screws for the hard disk bracket and 1 fixing screw for the ground wire to tilt down the hard disk toward you.

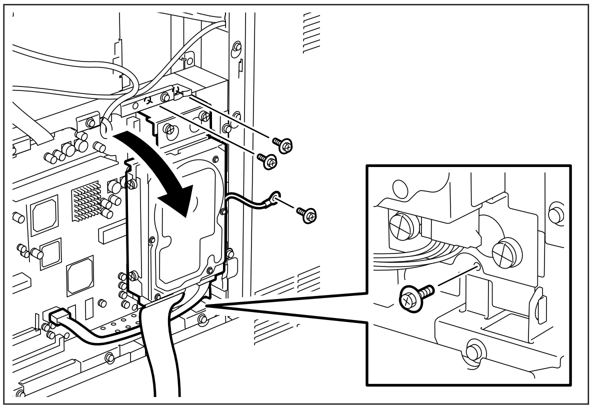


Fig. 2-549

(3) Remove 8 screws and take off the SYS board.

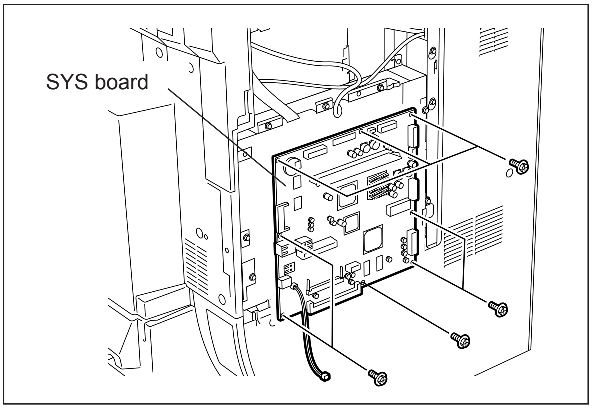


Fig. 2-550

[E] Switching power supply

(1) Take off the left cover (► Chapter 2.5.1 [J]).

(2) Remove 2 screws. Disconnect 2 connectors with lock on the front side and 1 connector while releasing the harness from the holder on the right side of the bracket.

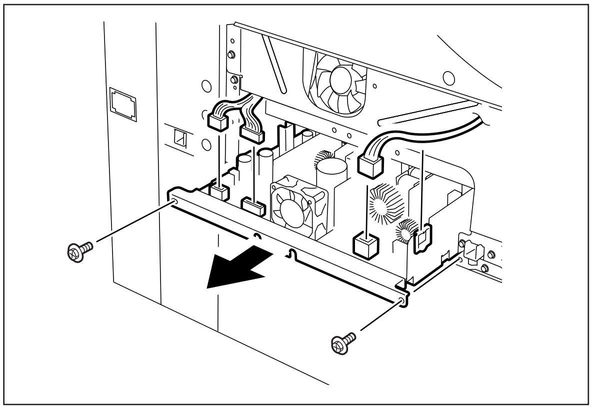


Fig. 2-551

(3) Disconnect 3 connectors while the switching power supply is pulled out to the front and take off the switching power supply.

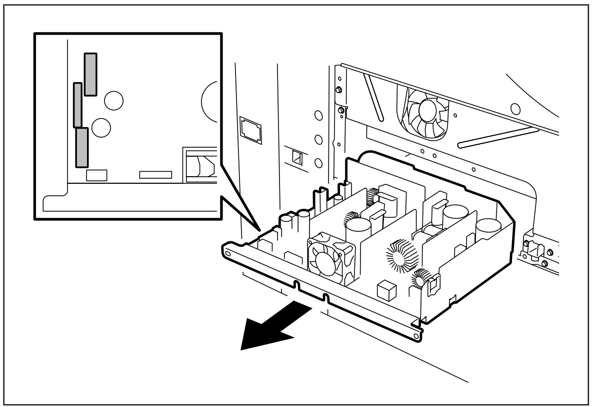


Fig. 2-552

[F] Power supply cooling fan

(1) Take off the left cover (► Chapter 2.5.1 [J]).

(2) Remove 2 screws and take off the power supply cooling fan on the switching power supply.

Note:

When installing, pay attention to the direction of the wind from the fan.

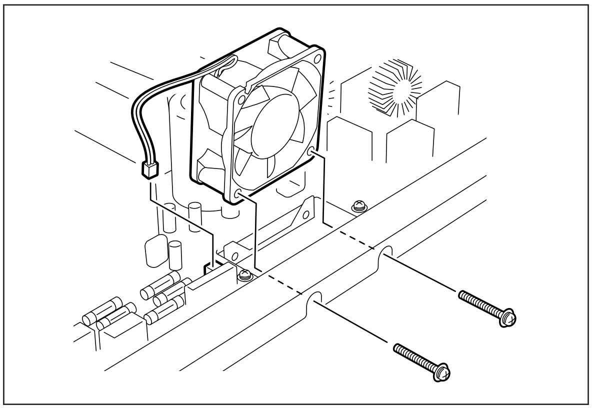


Fig. 2-553

[G] High-voltage transformer

(1) Take off the rear cover (► Chapter 2.5.1 [C]).

(2) Disconnect 7 connectors.

(3) Remove 2 screws and release 2 locking supports. Then take off the high-voltage transformer.

Note:

When installing, make sure to match the colors of connectors and harnesses according to the color instruction on the board.

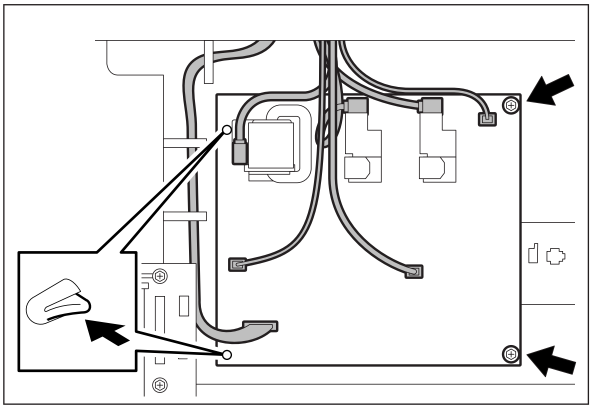


Fig. 2-554

[H] Noise filter

(1) Take off the rear cover and right lower cover (► Chapter 2.5.1 [C] [O]).

(2) Disconnect 4 connectors. Remove 1 screw and 1 washer. Then take off the noise filter.

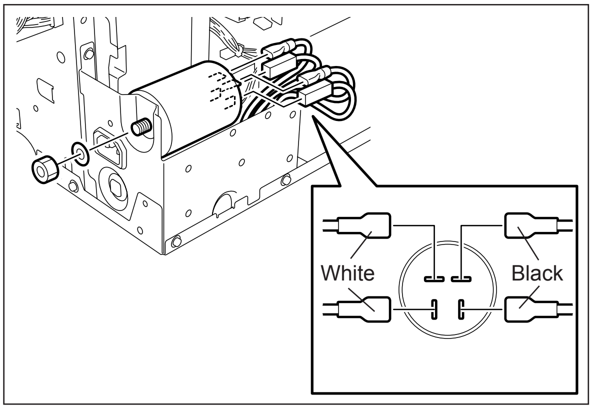


Fig. 2-555

2.6 Options

[A] MR-3015 (Reversing Automatic Document Feeder (RADF))

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover.

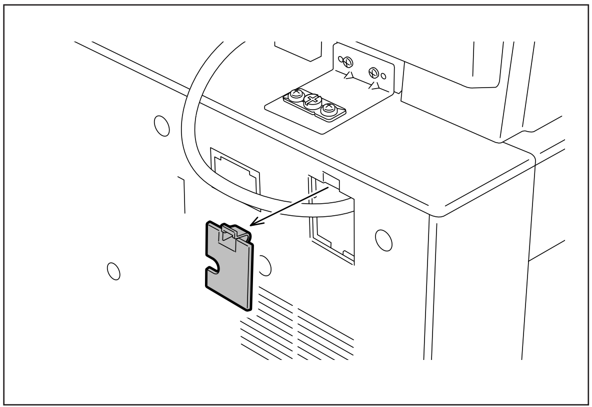


Fig. 2-601

(3) Disconnect the connector.

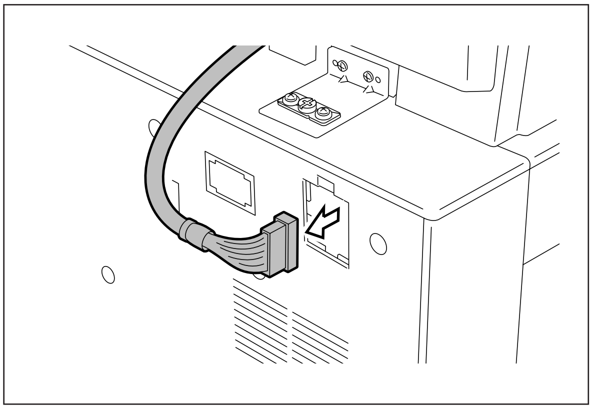


Fig. 2-602

(4) Remove 2 screws on the rear side.

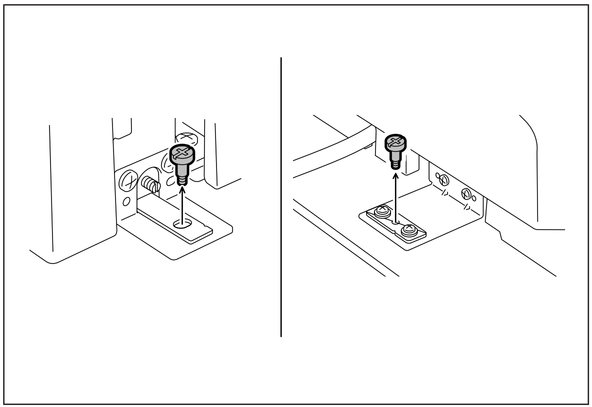


Fig. 2-603

(5) Open the RADF.

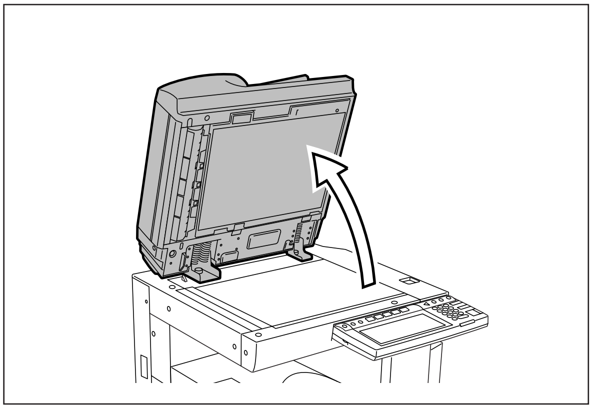


Fig. 2-604

(6) Remove 2 screws on the front side.

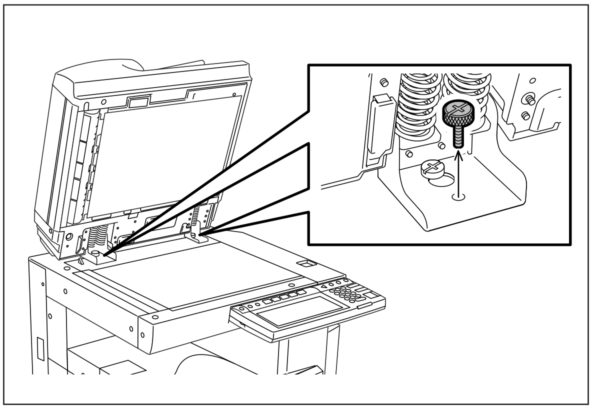


Fig. 2-605

(7) Slide the RADF backward and take off by lifting it up.

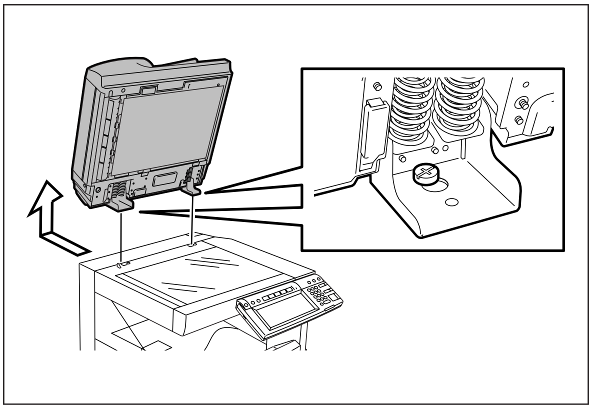


Fig. 2-606

[B] KD-1011 (Paper Feed Pedestal (PFP))

(1) Turn OFF the power and unplug the power cable.

(2) Take off the rear cover of the equipment. (► Chapter 2.5.1 [C])

Note:

Disconnect the connector of the RADF first when the RADF is installed.

(3) Remove 1 screw and the ground wire, and then disconnect 2 connectors (3 if the optional damp heater is installed).

(4) Remove 2 screws and take off 2 fixing brackets on the rear side.

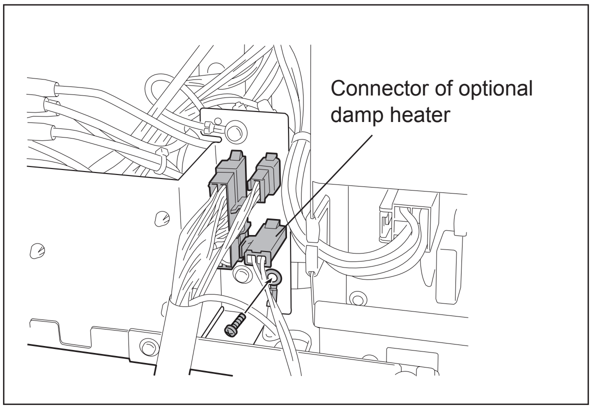


Fig. 2-607

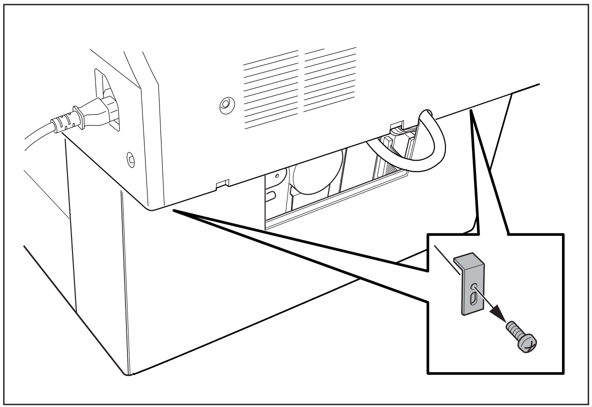


Fig. 2-608

(5) Take off the lower drawer of the equipment and PFP upper drawer.

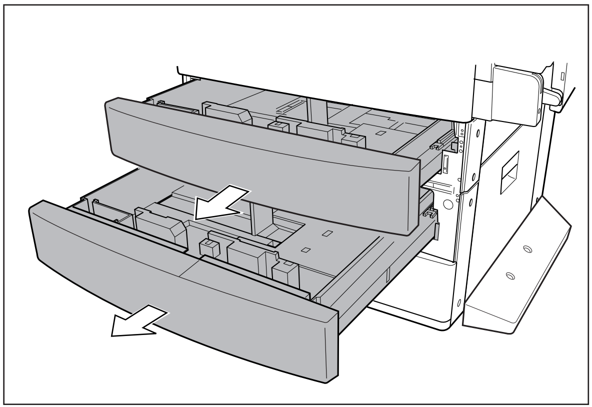


Fig. 2-609

(6) Remove 4 screws and take off 2 fixing brackets on the front side.

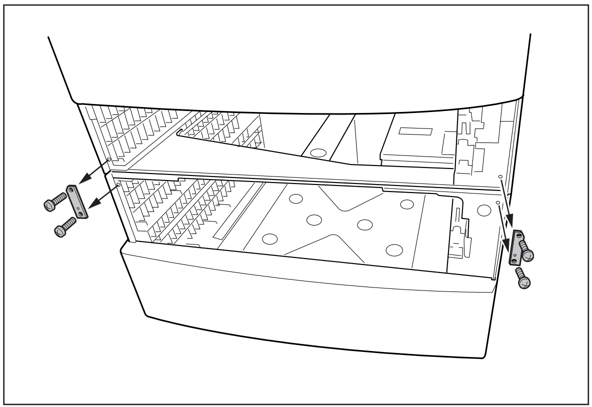


Fig. 2-610

(7) Lift up the equipment and take off the PFP.

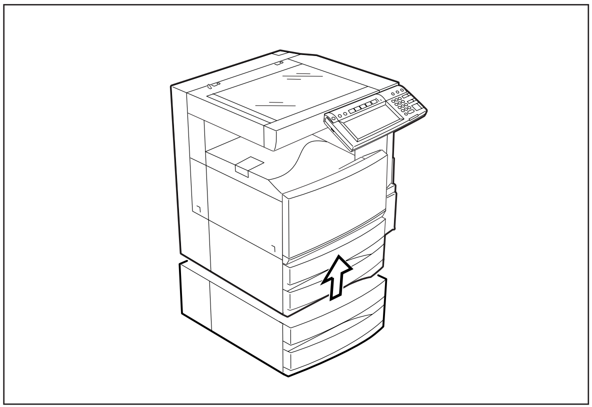


Fig. 2-611

[C] KD-1012 (Large Capacity Feeder (LCF))

(1) Turn OFF the power and unplug the power cable.

(2) Take off the rear cover of the equipment.
(► Chapter 2.5.1 [C])

Note:
Disconnect the connectors of the RADF first when the RADF is installed.

(3) Remove 1 screw and the ground wire, and then disconnect 2 connectors (3 if the optional damp heater is installed).

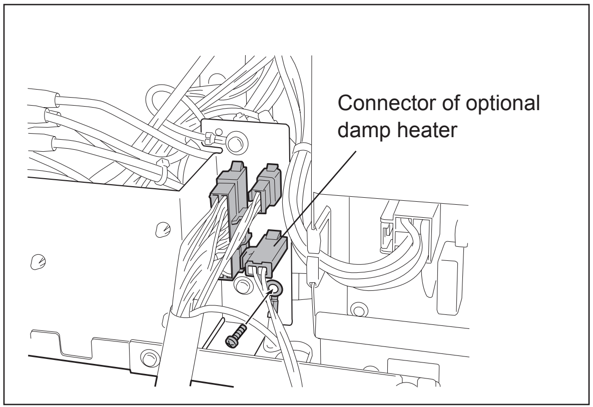


Fig. 2-612

(4) Remove 2 screws and take off 2 fixing brackets on the rear side.

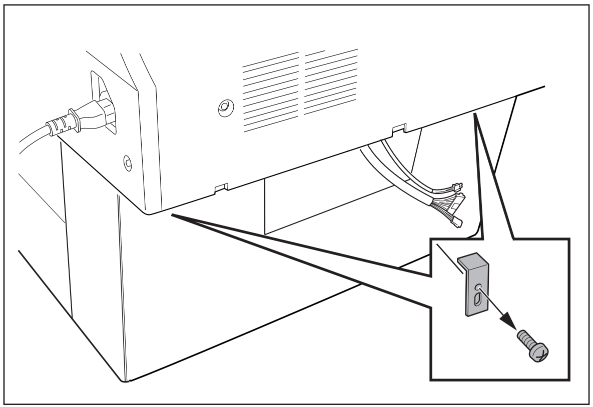


Fig. 2-613

(5) Take off the lower drawer of the equipment.

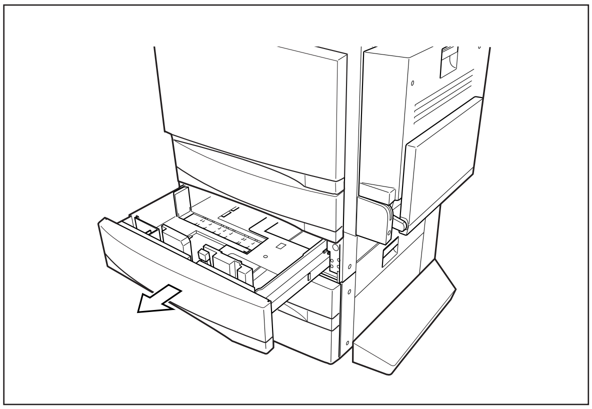


Fig. 2-614

(6) Pull out the LCF drawer.

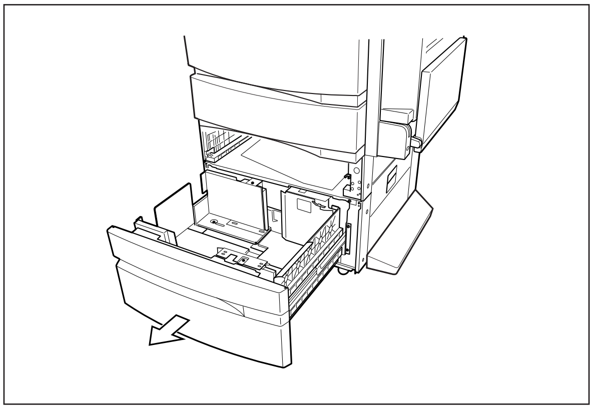


Fig. 2-615

(7) Remove 4 screws and take off 2 fixing brackets on the front side.

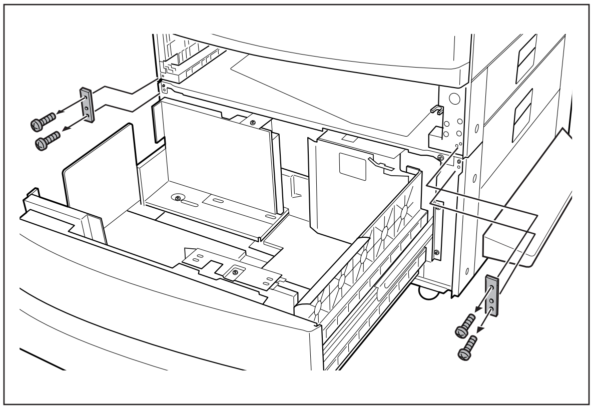


Fig. 2-616

(8) Lift up the equipment and take off the LCF.

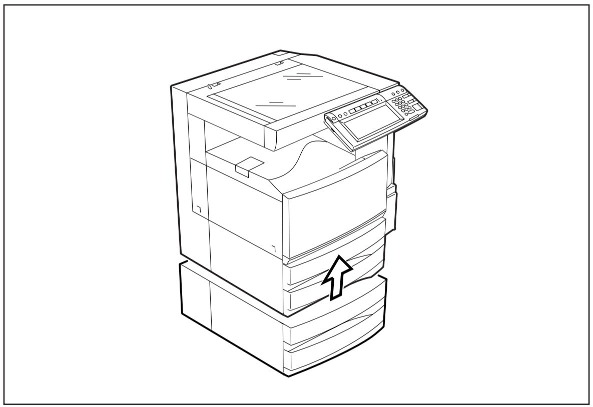


Fig. 2-617

[D] MJ-1022 (Hanging finisher)

(D-1) When PFP/LCF is not installed

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover and disconnect the connector.

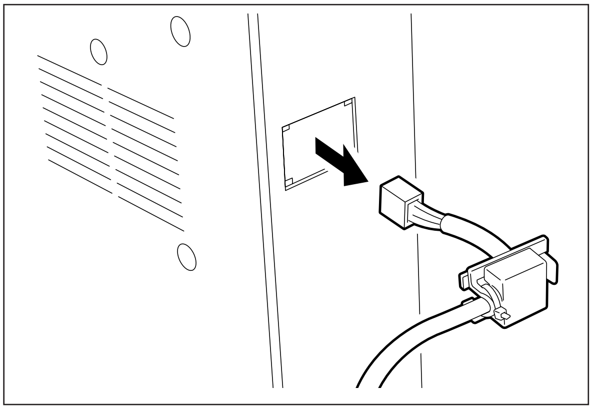


Fig. 2-618

(3) Remove 2 screws and take off the safety bracket on the rear side and the cover.

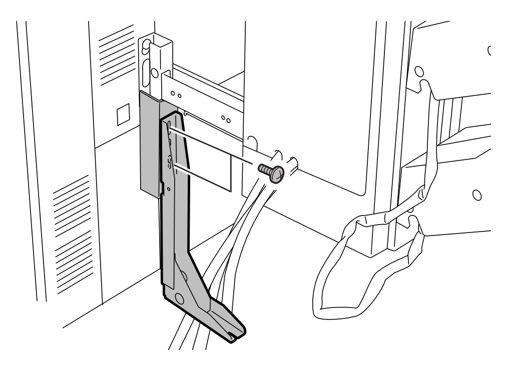


Fig. 2-619

(4) Remove 2 screws and take off the safety bracket on the front side and the cover.

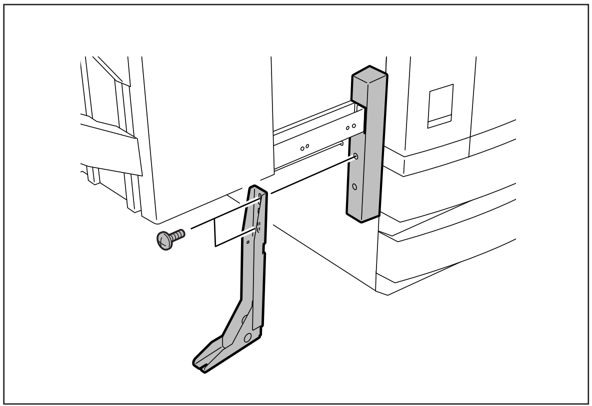


Fig. 2-620

(5) Remove 2 screws.

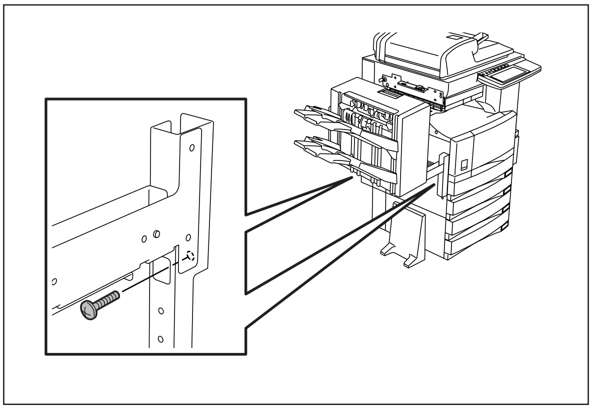


Fig. 2-621

(6) Lift up the finisher and take it off.

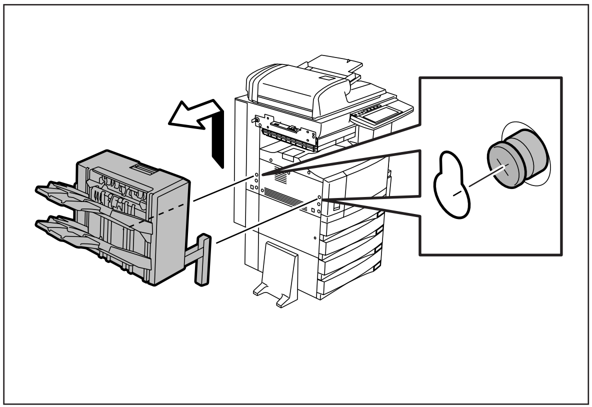


Fig. 2-622

(D-2) When PFP/LCF is installed

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover and disconnect the connector.

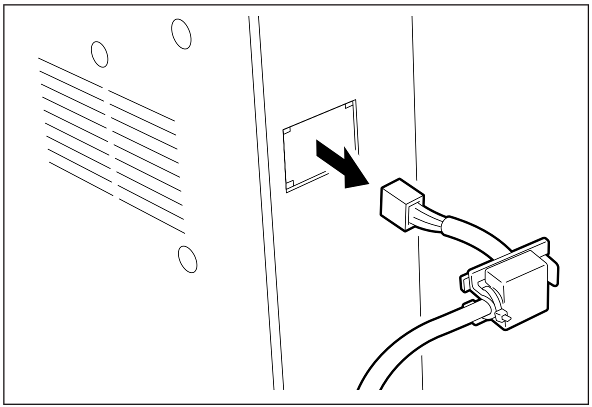


Fig. 2-623

(3) Remove 2 screws and take off the cover on the rear side.

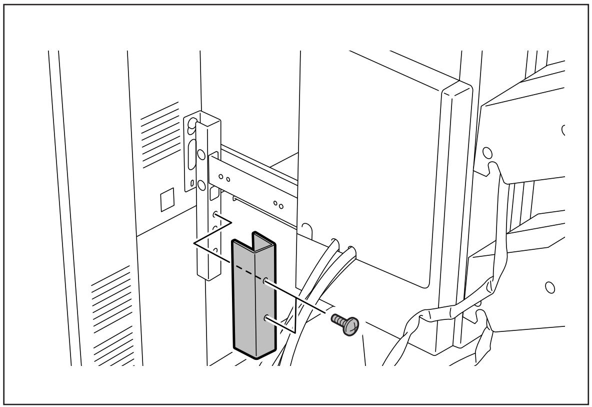


Fig. 2-624

(4) Remove 2 screws and take off the cover on the front side.

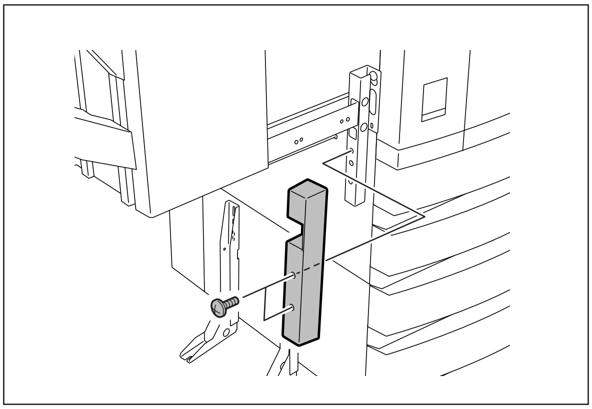


Fig. 2-625

(5) Remove 2 screws.

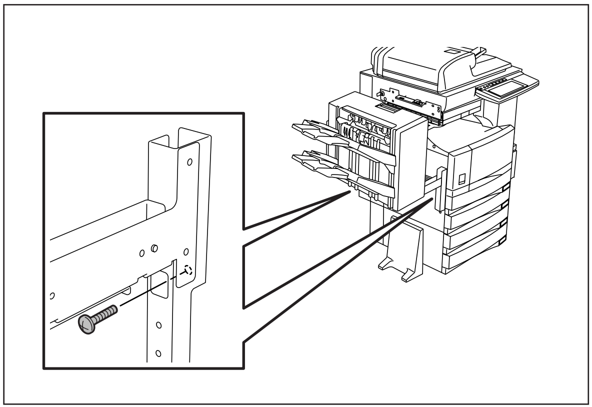


Fig. 2-626

(6) Lift up the finisher and take it off.

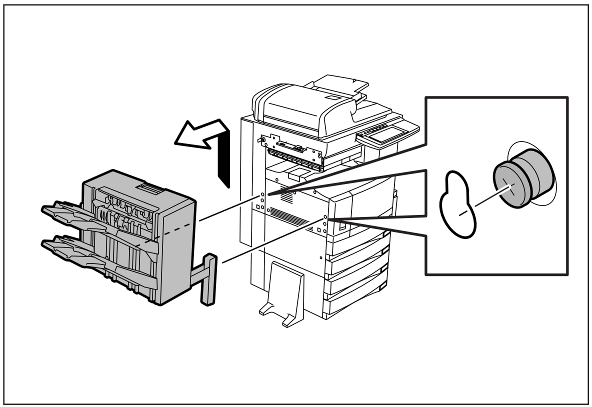


Fig. 2-627

[E] MJ-1023 (Console finisher)

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover and disconnect the connector.

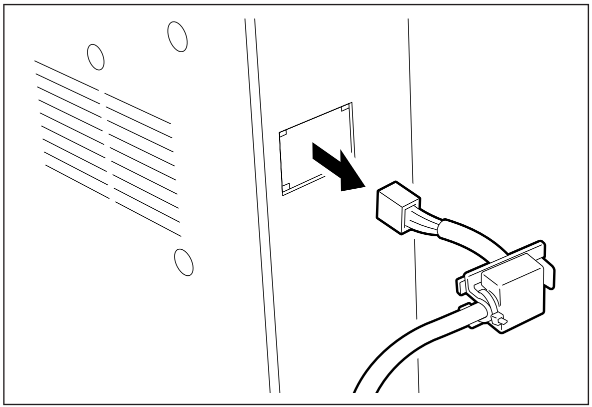


Fig. 2-628

(3) Remove 1 screw and take off the finisher lower cover.

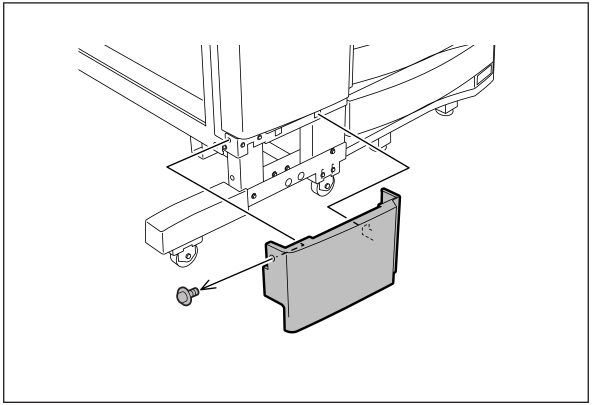


Fig. 2-629

(4) Remove 3 screws and take off the finisher front cover.

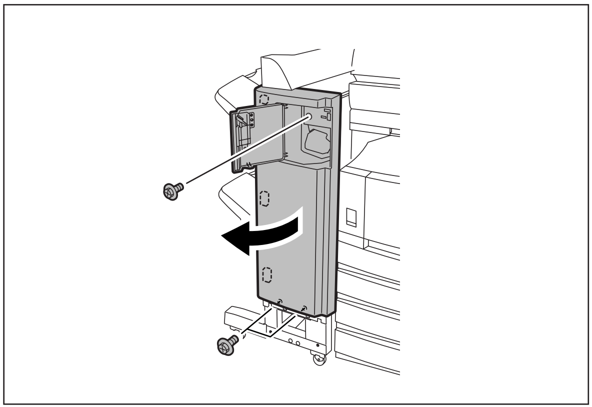


Fig. 2-630

(5) Remove 1 screw.

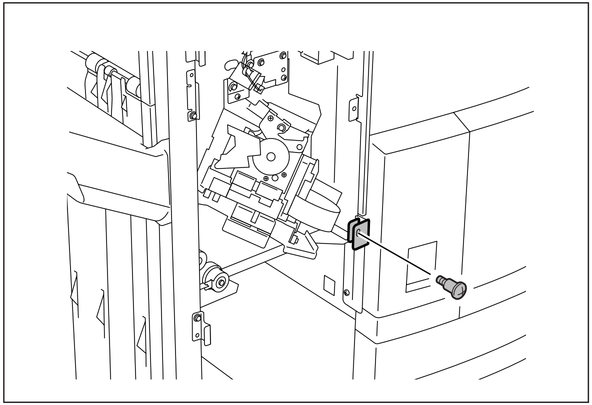


Fig. 2-631

(6) Remove 1 screw and take off the cover of the finisher rear side.

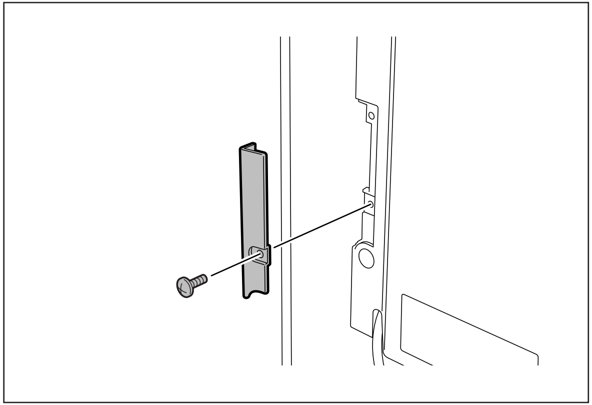


Fig. 2-632

(7) Remove 1 screw.

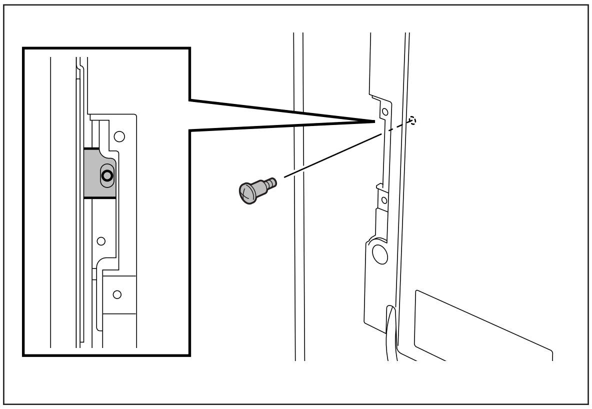


Fig. 2-633

(8) Take off the finisher.

Note:

Be careful not to fell the finisher when moving the finisher unit only.

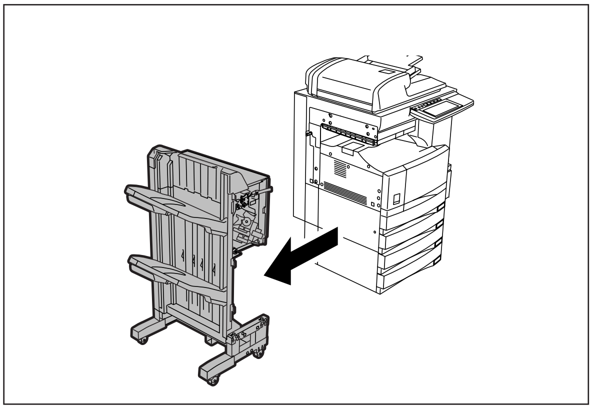


Fig. 2-634

[F] MJ-1024 (Console finisher)

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover and disconnect the connector.

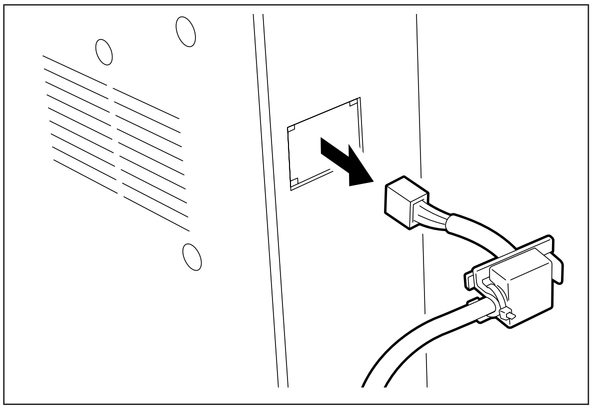


Fig. 2-635

(3) Open the finisher front cover and remove 1 screw.

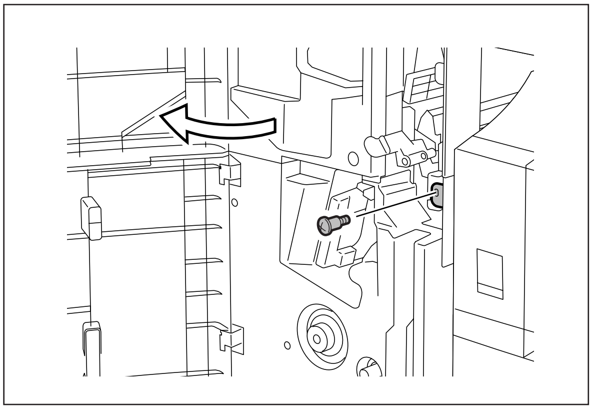


Fig. 2-636

(4) Remove 1 screw and take off the cover of the finisher rear side.

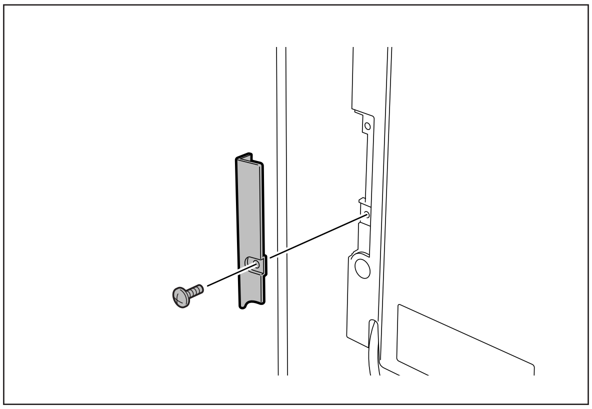


Fig. 2-637

(5) Remove 1 screw.

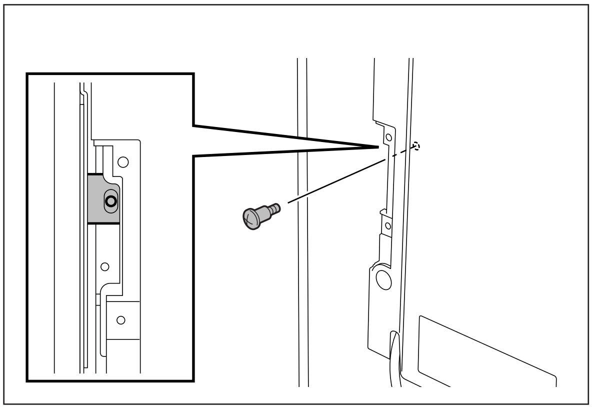


Fig. 2-638

(6) Take off the finisher.

Note:

Be careful not to fell the finisher when moving the finisher unit only.

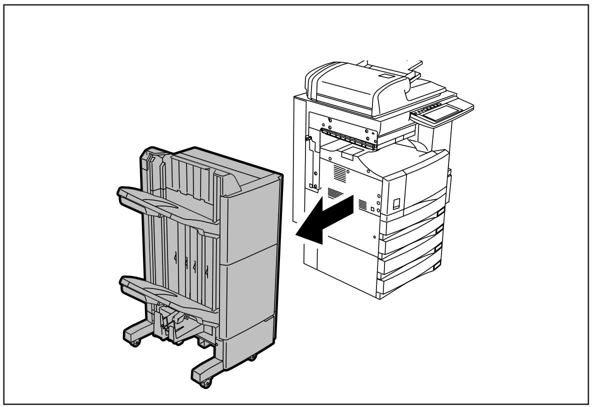


Fig. 2-639

[G] MJ-6004 (Hole punch unit)

(1) Turn OFF the power and unplug the power cable.

(2) Take off the connector cover and disconnect connector.

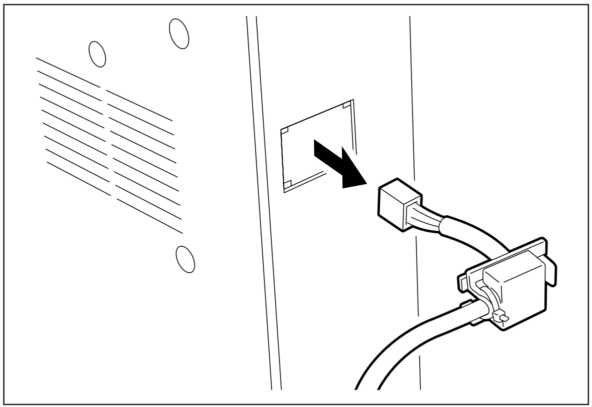


Fig. 2-640

(3) Open the front cover of the hole punch unit and remove 1 screw.

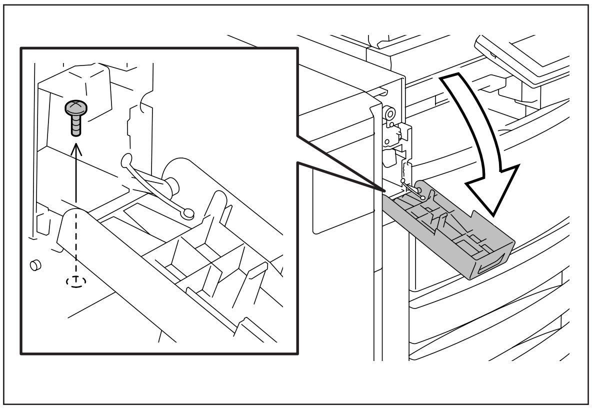


Fig. 2-641

(4) Take off the cover of the punch unit lower side.

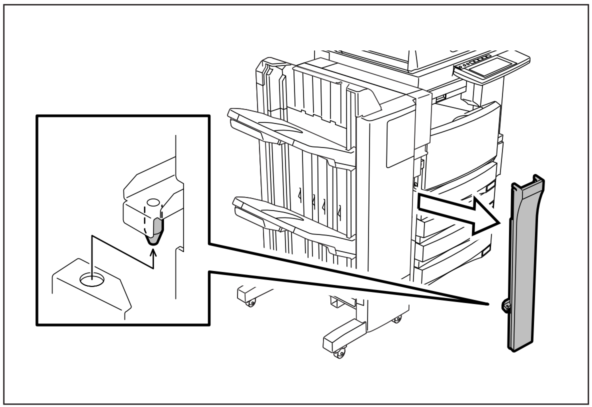


Fig. 2-642

(5) Remove 1 screw.

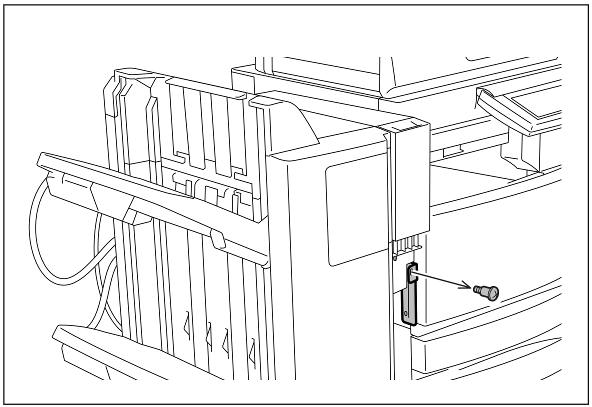


Fig. 2-643

(6) Remove 3 screws and take off the punch unit rear cover.

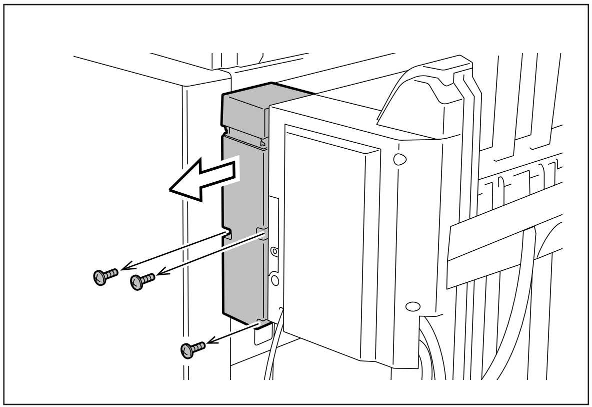


Fig. 2-644

(7) Remove 1 screw.

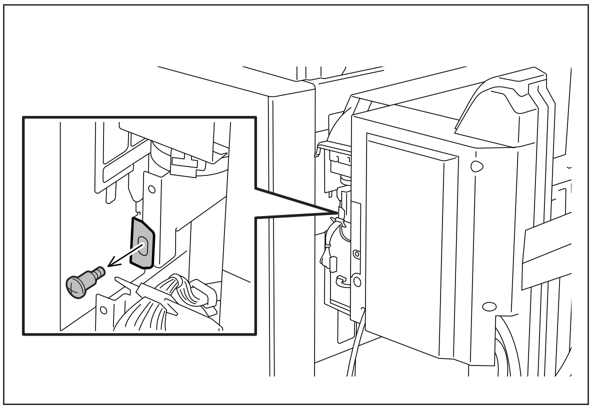


Fig. 2-645

(8) Take off the finisher with the hole punch unit.

Note:

Be careful not to fell the finisher when moving the finisher unit only.

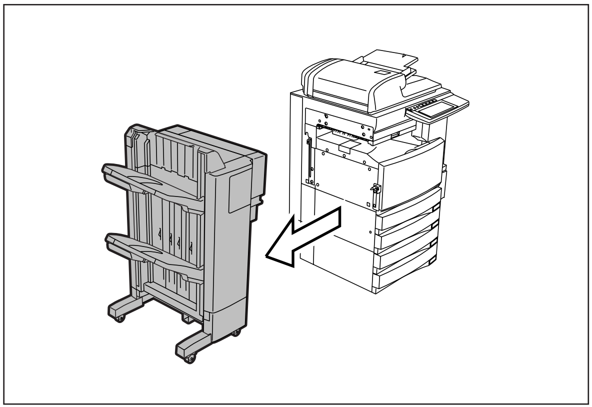


Fig. 2-646

(9) Disconnect 2 connectors.

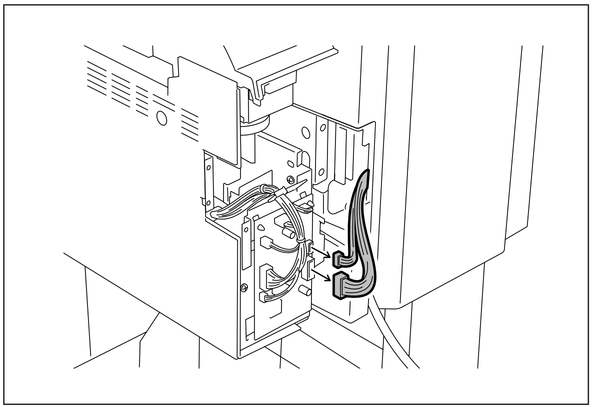


Fig. 2-647

(10) Remove 2 screws.

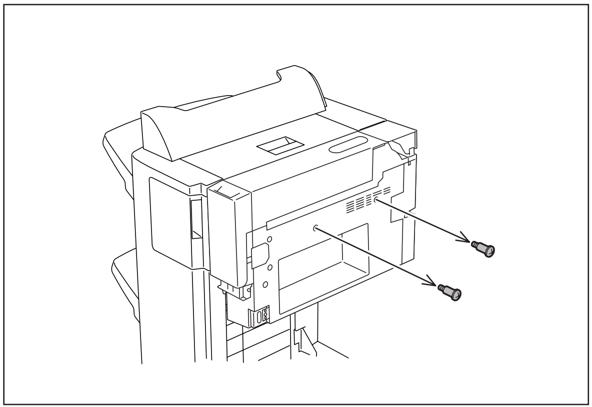


Fig. 2-648

(11) Lift up the punch unit and take it off.

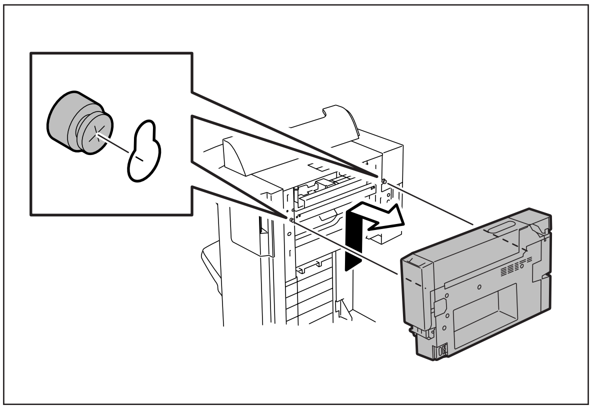


Fig. 2-649

[H] KN-3520 (Bridge unit)

(1) Turn OFF the power and unplug the power cable.

(2) Remove 2 screws and take off the cover.

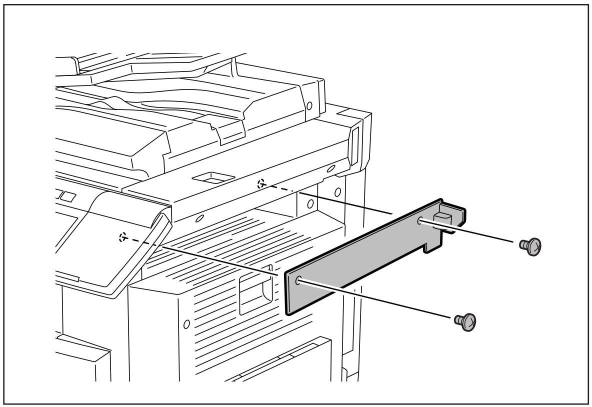


Fig. 2-650

(3) Disconnect 1 connector.

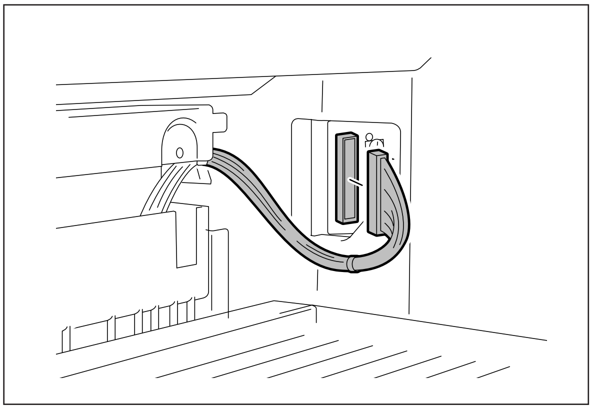


Fig. 2-651

(4) Open the bridge unit. Remove 1 screw and take off the cover.

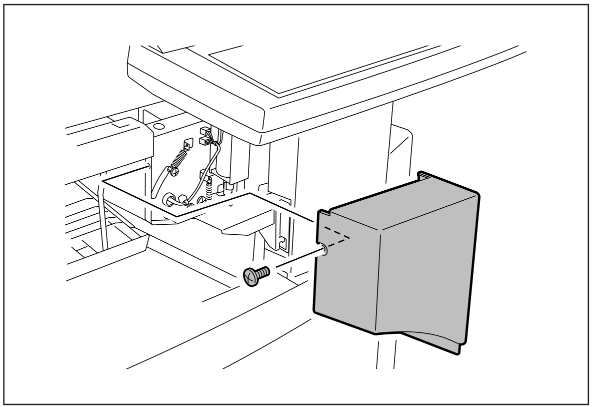


Fig. 2-652

(5) Close the bridge unit and remove 1 screw.

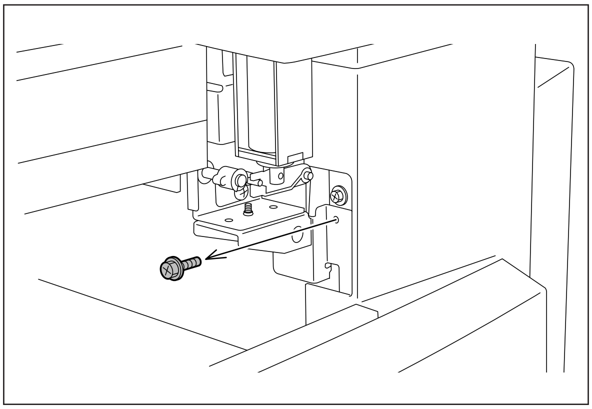


Fig. 2-653

(6) Remove 4 screws and take off the bracket.

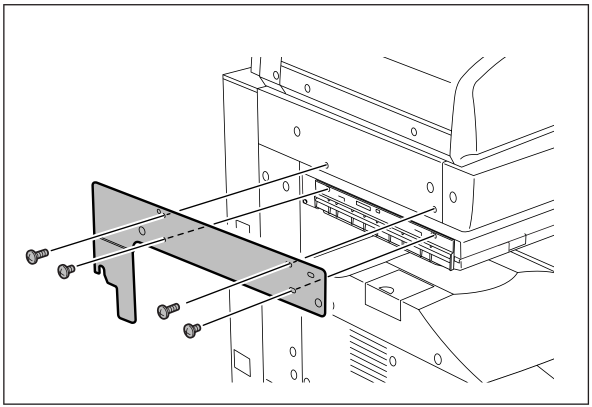


Fig. 2-654

(7) Lift up the bridge unit and release the hook. Take off the bridge unit toward the front.

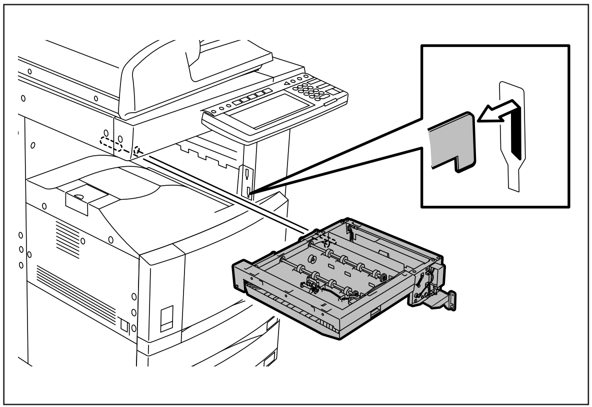


Fig. 2-655

[I] MJ-5004 (Job separator)

(1) Turn OFF the power and unplug the power cable.

(2) Take off the tray.

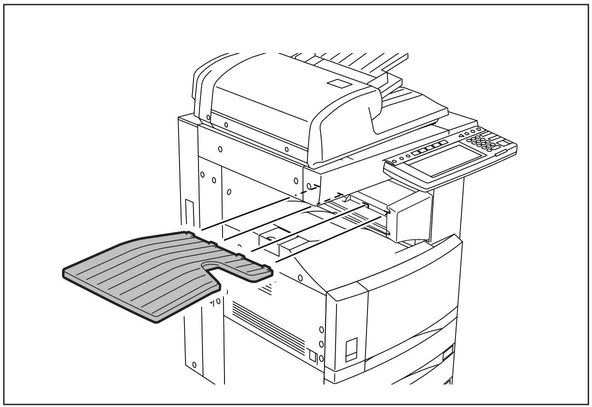


Fig. 2-656

(3) Remove 2 screws and take off the cover.

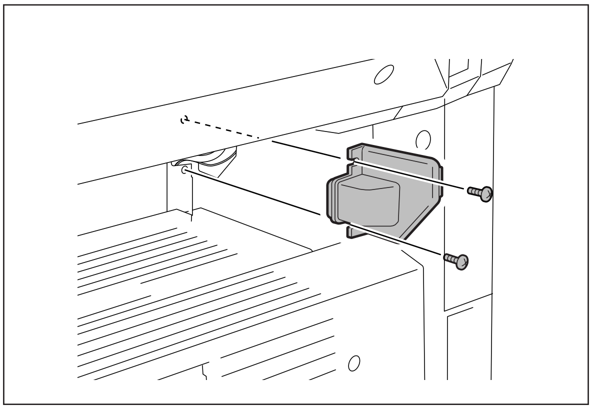


Fig. 2-657

(4) Disconnect 2 connectors.

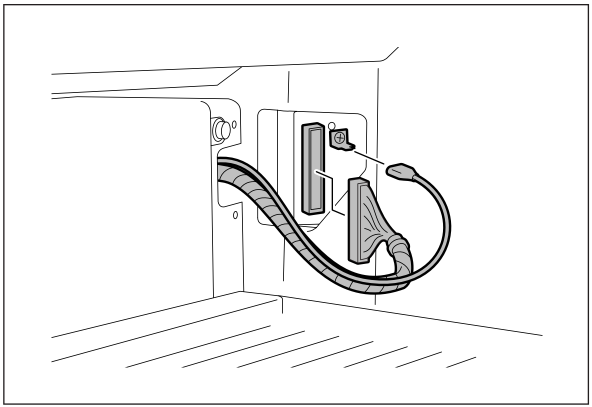


Fig. 2-658

(5) Loosen 2 screws and take off the cover.

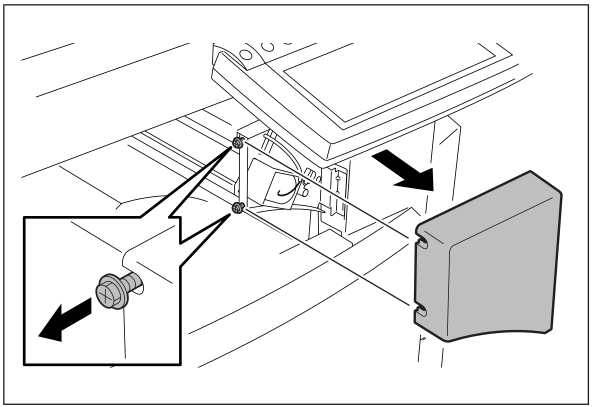


Fig. 2-659

(6) Remove 1 screw.

(7) Lift up the job separator and release the hook. Take off the job separator toward the front.

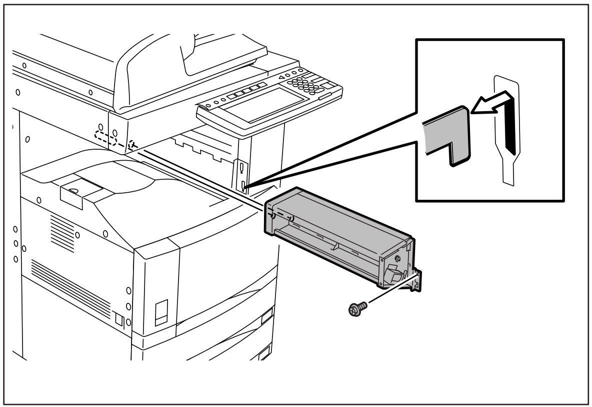


Fig. 2-660

[J] MJ-5005 (Offset tray)

(1) Turn OFF the power and unplug the power cable.

(2) Take off the tray.

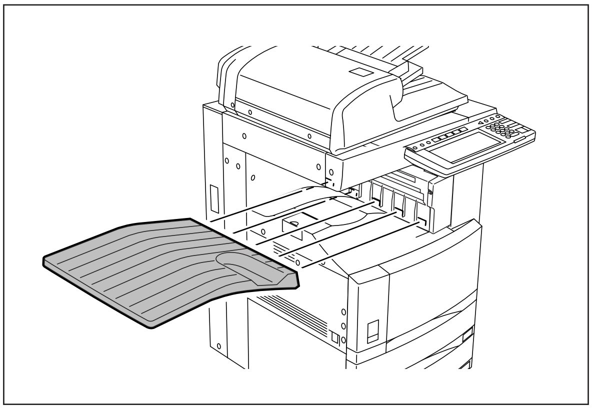


Fig. 2-661

(3) Remove 2 screws and take off the cover.

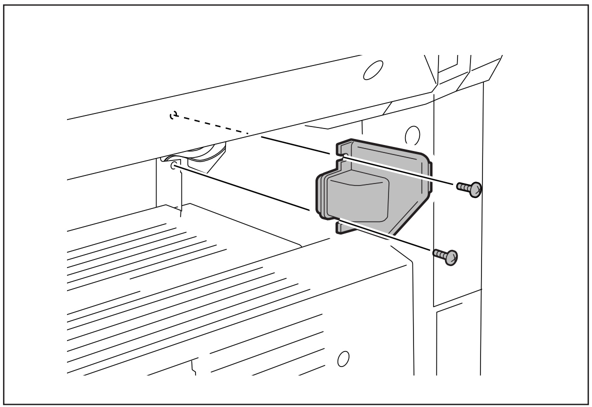


Fig. 2-662

(4) Disconnect 2 connectors.

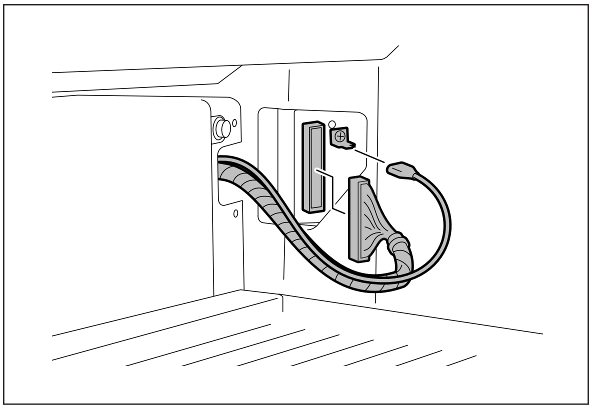


Fig. 2-663

(5) Remove 1 screw and take off the cover.

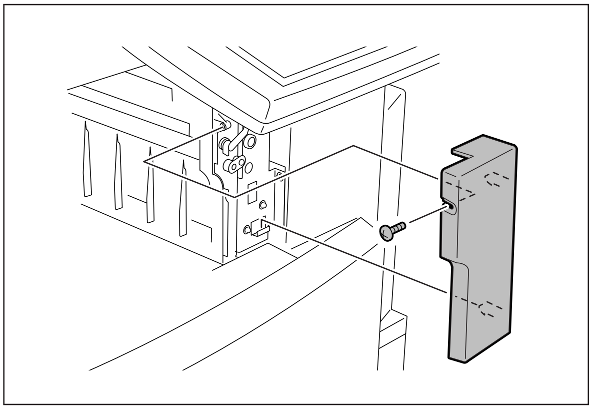


Fig. 2-664

(6) Remove 1 screw.

(7) Lift up the offset tray and release the hook. Take off the offset tray toward the front.

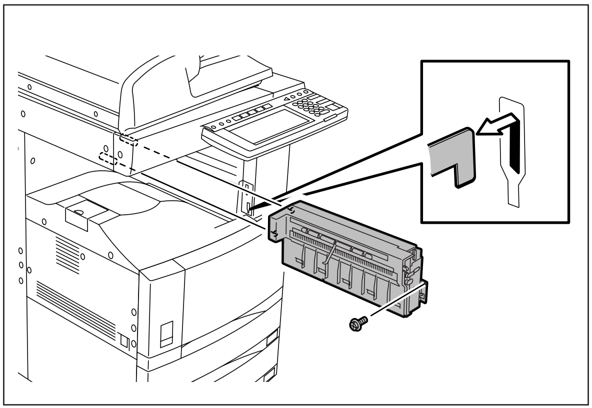


Fig. 2-665

[K] MR-3018 (Reversing Automatic Document Feeder (RADF))

(1) Turn the power OFF and unplug the power cable.

(2) Take off the connector cover.

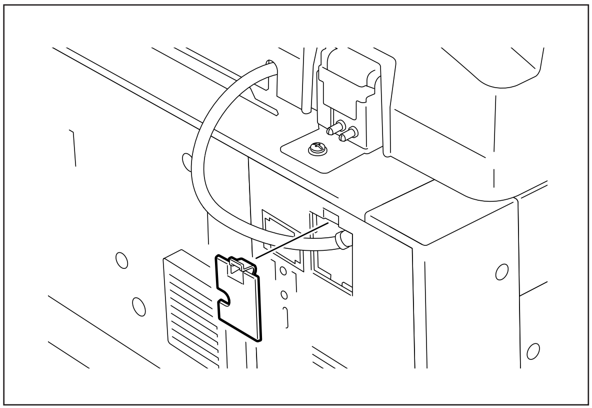


Fig. 2-666

(3) Disconnect the connector.

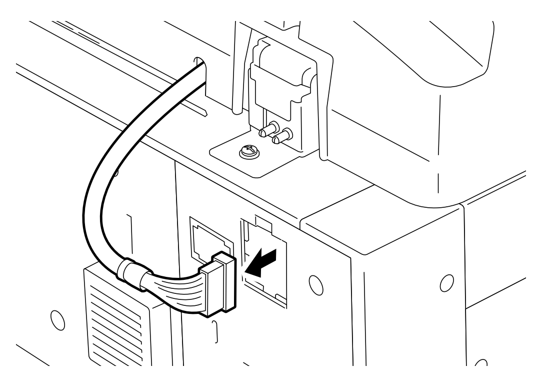


Fig. 2-667

(4) Remove 1 screw and 1 washer on the rear side.

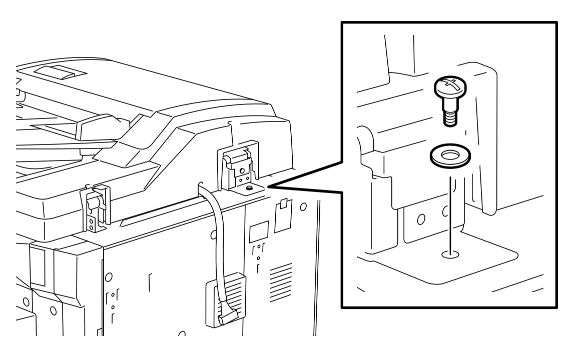


Fig. 2-668

(5) Remove 1 screw on the rear side.

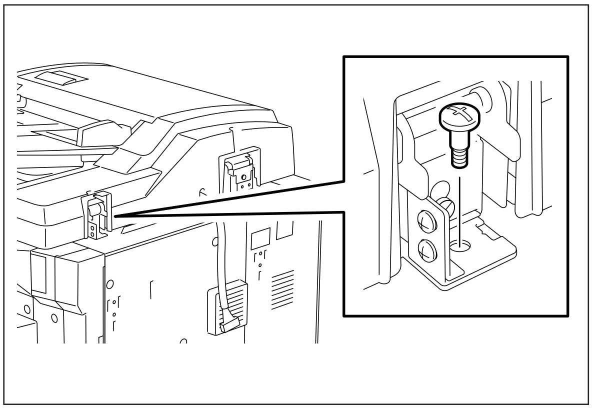


Fig. 2-669

(6) Open the RADF.

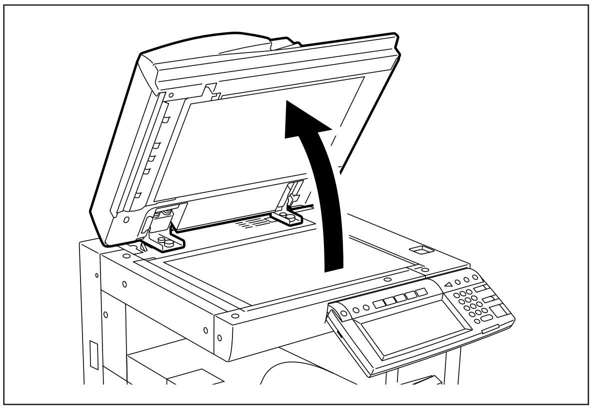


Fig. 2-670

(7) Remove 2 screws on the front side.

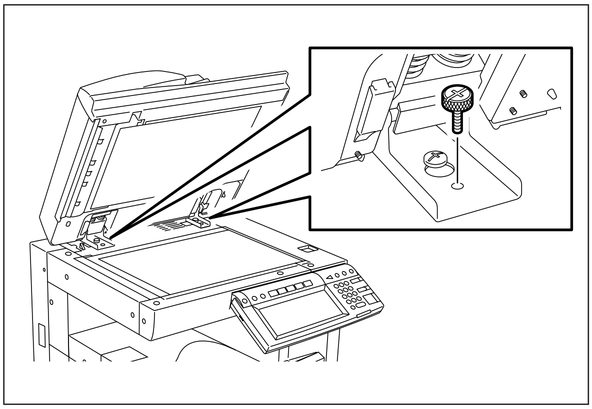


Fig. 2-671

(8) Slide the RADF backward and take it off by lifting it up.

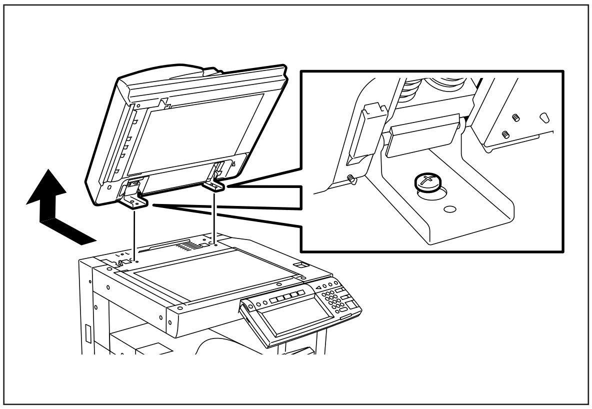


Fig. 2-672

[L] MJ-1101 (Console finisher)

(1) Turn the power OFF and unplug the power cable.

(2) Take off the connector cover and disconnect 1 connector.

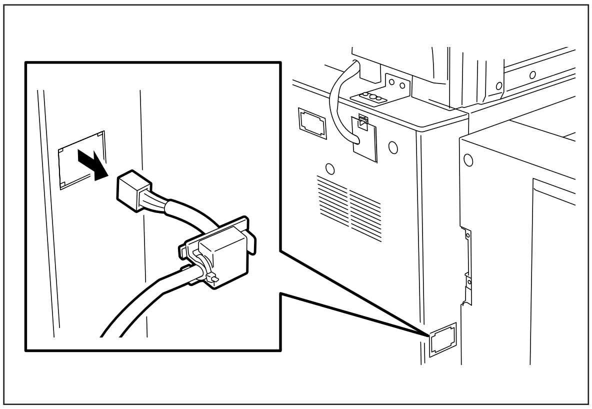


Fig. 2-673

(3) Open the front cover of the finisher. Remove 1 screw and slide the lever to the front side.

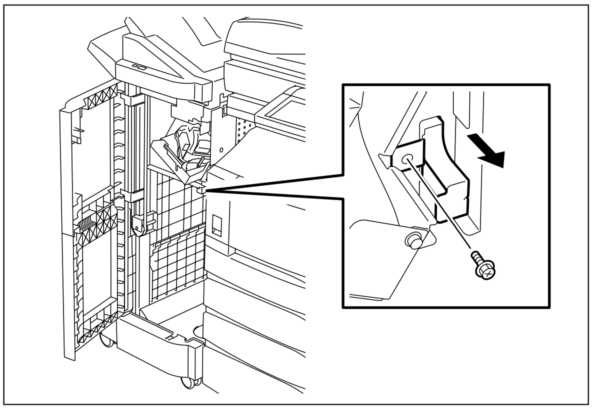


Fig. 2-674

(4) Take off the finisher.

Note:

When moving the finisher unit by itself, be careful that it does not topple over.

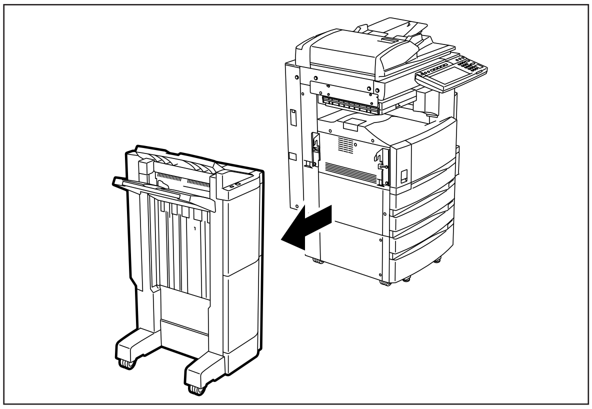


Fig. 2-675

[M] MJ-6101(Hole punch unit)

(1) Turn the power off and unplug the power cable.

(2) Take off the connector cover and disconnect the connector.

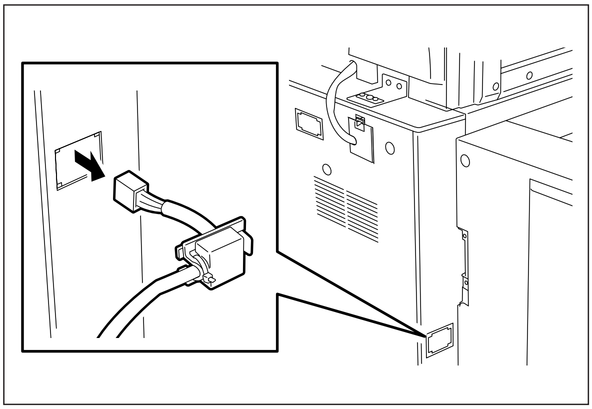


Fig. 2-676

(3) Release the Latches and take off the front lower cover of the hole punch unit.

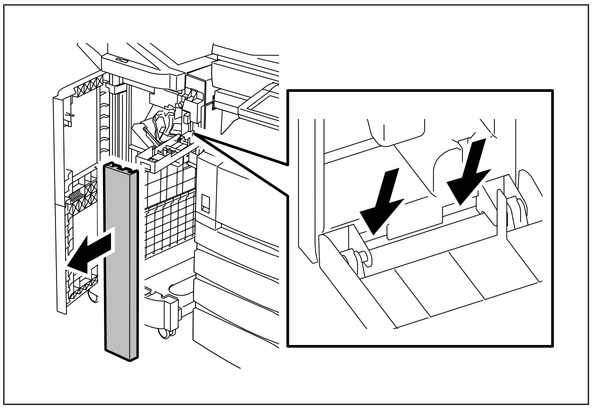


Fig. 2-677

(4) Remove 1 screw and slide the lever to the front side.

(5) Take off the finisher.

Note:

When moving the finisher unit by itself, be careful that it does not topple over.

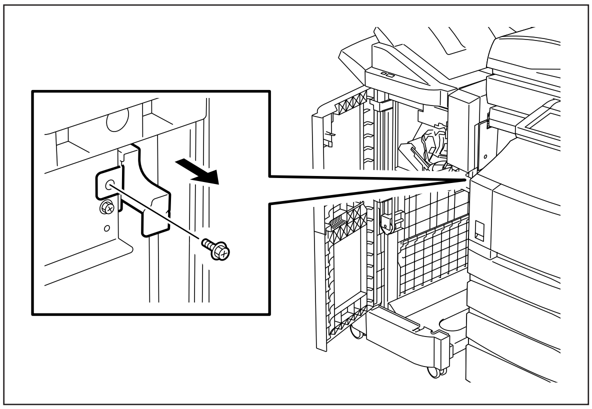


Fig. 2-678

(6) Remove 1 screw and take off the maintenance cover.

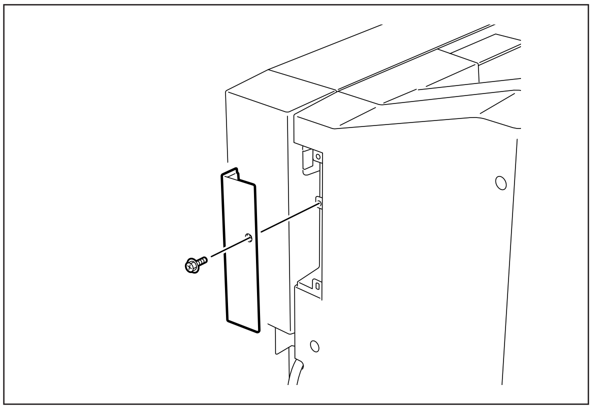


Fig. 2-679

(7) Disconnect 1 connector.

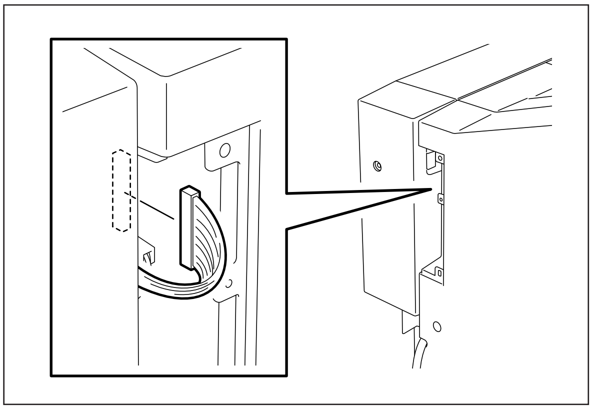


Fig. 2-680

(8) Remove 2 screws.

(9) Take off the hole punch unit.

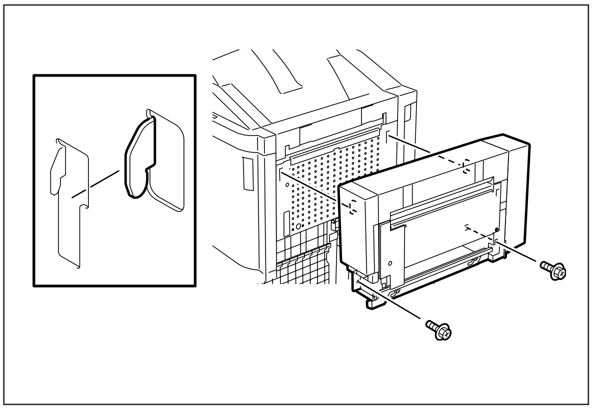


Fig. 2-681

3. COPY PROCESS

3.1 General Description of Copying Process

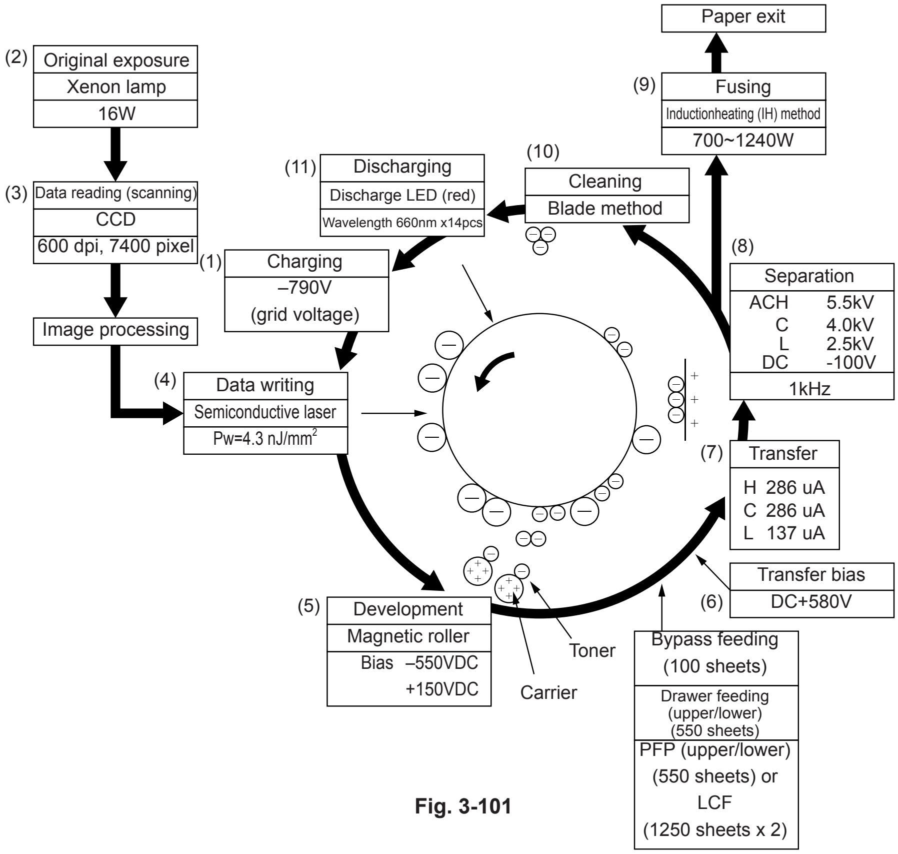

Paper exit
(2) Original exposure
Xenon lamp
16W
(9) Fusing
Inductionheating (IH) method
700~1240W
(10) Cleaning
Blade method
(11) Discharging
Discharge LED (red)
Wavelength 660nm x14pcs
(3) Data reading (scanning)
CCD
600 dpi, 7400 pixel
(1) Charging
–790V
(grid voltage)
(8) Separation
ACH 5.5kV
C 4.0kV
L 2.5kV
DC -100V
1kHz
Image processing
(4) Data writing
Semiconductive laser
Pw=4.3 nJ/mm²
(7) Transfer
H 286 uA
C 286 uA
L 137 uA
Transfer bias
(6) DC+580V
(5) Development
Magnetic roller
Bias –550VDC
+150VDC
Toner
Carrier
Bypass feeding
(100 sheets)
Drawer feeding
(upper/lower)
(550 sheets)
PFP (upper/lower)
(550 sheets) or
LCF
(1250 sheets x 2)

Fig. 3-101

(1) Charging: Applies negative charge on the surface of the photoconductive drum.

↓

(2) Original exposure: Converts images on the original into optical signals.

↓

(3) Data reading: The optical signals are converted into electrical signals.

↓

(4) Data writing: The electrical signals are converted into light signal (laser emission) which exposes the surface of the photoconductive drum.

↓

(5) Development: Negatively-charged toner adheres to the photoconductive drum and forms visible image.

↓

(6) Transfer bias: Improves transfer efficiency.

↓

(7) Transfer: Transfers the visible toner image on the photoconductive drum onto paper.

↓

(8) Separation: Separates paper with the toner image from the photoconductive drum.

↓

(9) Fusing: Fuses the toner image onto the paper by applying heat and pressure.

↓

(10) Cleaning : Scrapes off the residual toner from the drum.

↓

(11) Discharging : Eliminates the residual negative charge from the surface of the photoconductive drum.

3.2 Details of Copying Process

(1) Photoconductive drum

The photoconductive drum consists of two layers. The outer layer is a photoconductive layer made of an organic photoconductive carrier (OPC), and the inner layer is an aluminum conductive base in a cylindrical form.

The photoconductor has the following property: when it is exposed to light, the electrical resistance it possesses increases or decreases according to the strength of the light.

Example:

- Strong lighten
  Resistance is decreased (works as a conductor.)
- Weak lighten
  Resistance is increased (works as an insulator.)

[Formation of electrostatic latent image]

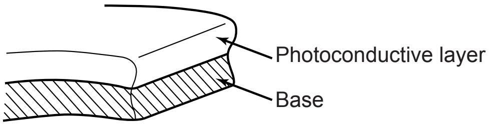
In the processes of charging, data reading, data writing, discharging described later, negative potential of the areas on the drum corresponding to black areas of the original are eliminated, while the areas on the drum corresponding to white areas retains the negative charge.

As this image on the drum formed by the negative potential is not visible, it is called an “electrostatic latent image.”(2) Charging

Charging is the process to apply charge evenly on the drum surface.

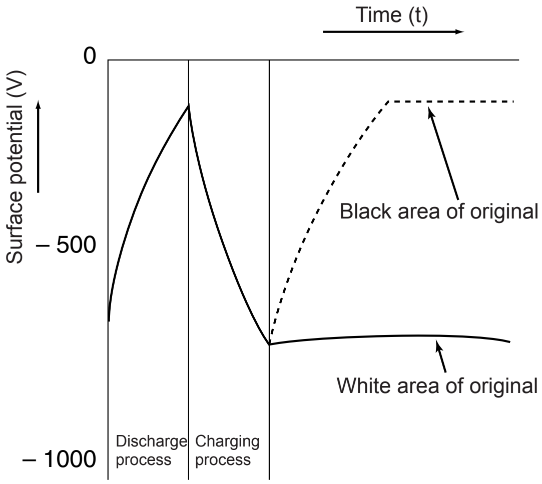
The charger wire produces negative corona discharge is controlled by the grid, allowing the drum surface to be evenly charged with the negative potential.

The surface potential on the drum is determined by the grid potential and is controlled to a certain value by the grid control circuit.



Structure of the photoconductive drum
(Example of OPC)

Fig. 3-201



Electric potential of the photoconductive drum

Fig. 3-202

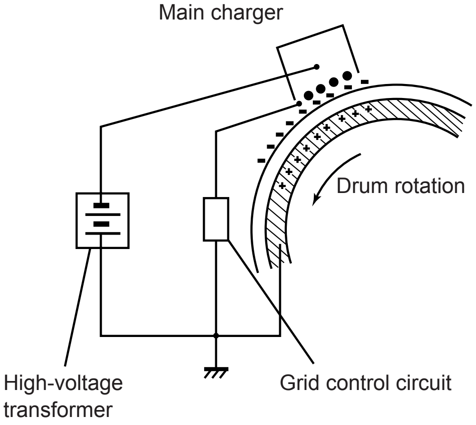


Fig. 3-203

(3) Data reading (scanning)

Data reading is the process of illuminating the original with light and converting the reflected light into electrical signals.
The light reflected from the original is directed to the charge coupled device (CCD) and this optical image information is converted into electrical signals (image signals), which are then transmitted to the image processing section.

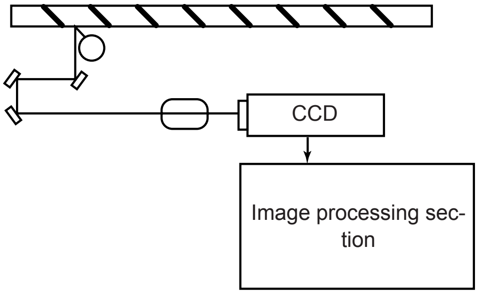
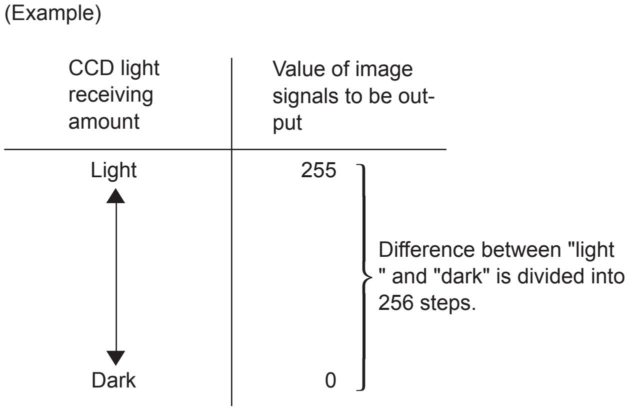

CCD
Image processing section

Fig. 3-204



(Example)

CCD light receiving amount	Value of image signals to be output
Light	255
Dark	0

Difference between "light " and "dark" is divided into 256 steps.

Fig. 3-205

(4) Data writing

Data writing is the process of converting the image signals sent from the image processing section into optical signal and exposing the drum surface with the light.
Semiconductive laser element converts image signals transmitted from the image processing section into optical signal (laser emission) to expose the drum surface and form an electrostatic latent image on it.

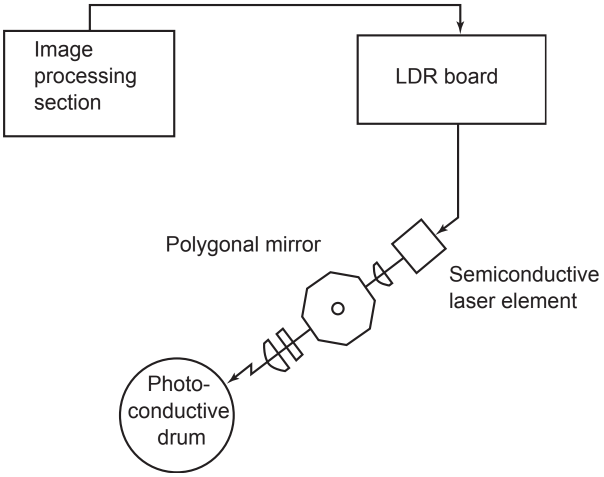


Image processing section
LDR board
Polygonal mirror
Semiconductive laser element
Photo-conductive drum

Fig. 3-206

(5) Development

Development is the process of making the electrostatic latent images visible to the eye (visible images).

Developer material is supplied to the photoconductive drum surface by the magnetic roller. The toner in the developer material adheres to the areas on the drum surface where the potential is lower than the developer bias which is applied to the magnetic roller (reverse development method).

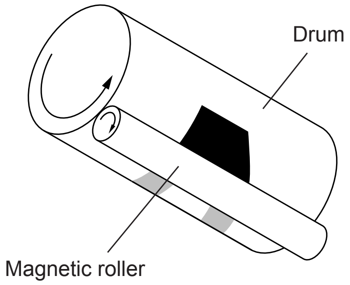

Drum
Magnetic roller

Fig. 3-207

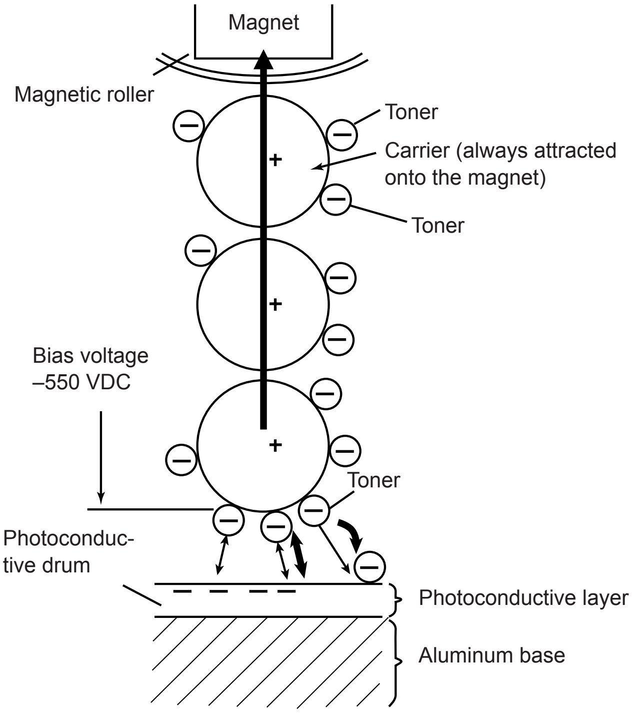

Magnet
Magnetic roller
Toner
Carrier (always attracted onto the magnet)
Toner
Bias voltage
–550 VDC
Toner
Photoconductive drum
Photoconductive layer
Aluminum base

Fig. 3-208

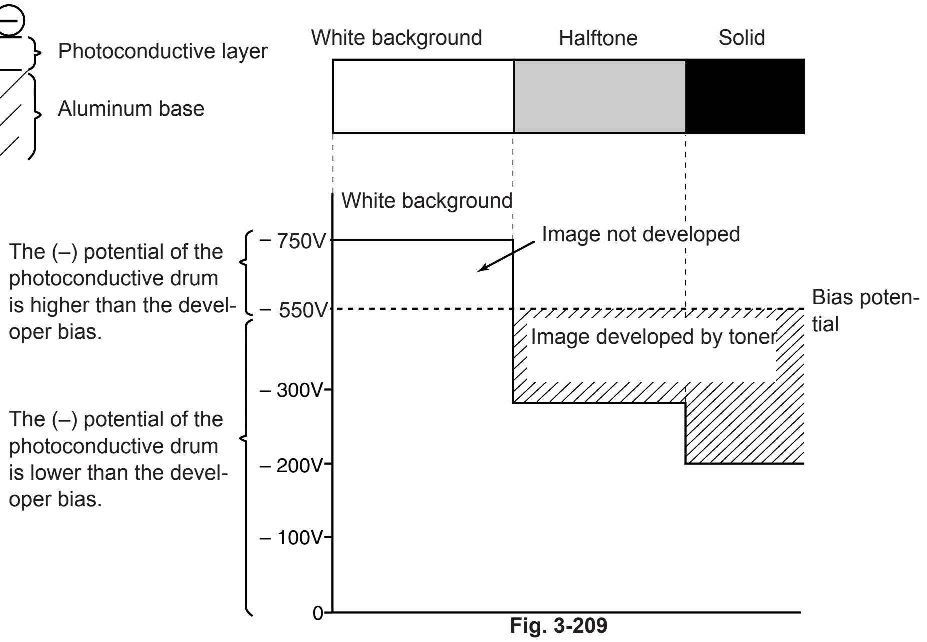


Fig. 3-209

- Switching of developer bias polarity

  With the area which has no negative charge, background fogging is decreased by switching the bias to the positive polarity (approx. +150 V).

- Developer material

  The developer material consists of a mixture of the toner and carrier. The toner is charged to the negative polarity and the carrier to positive polarity due to the friction with each other caused by mixing.

  Toner : Mainly consists of the resin and carbon.

  Carrier : Consists of the ferrite and resin coating on its surface to provide consistent frictional electrification.

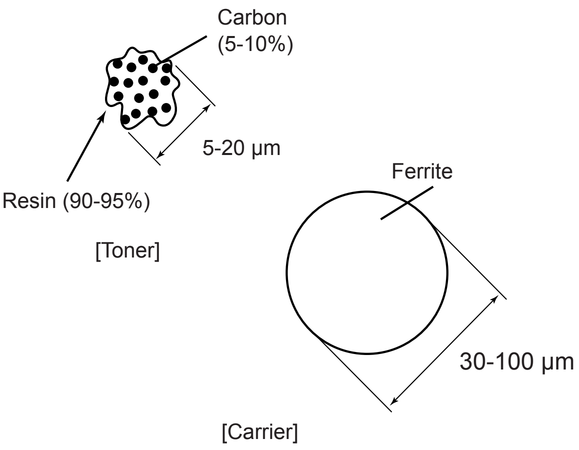


Fig. 3-210

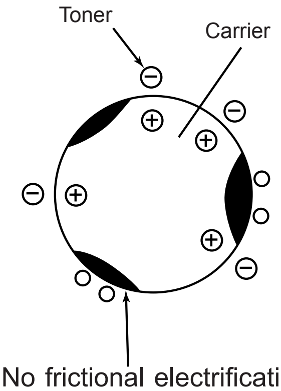
Note:
If the developer material is used for a long time (beyond its normal life span), the toner is caked onto the carrier.

↓

The charging performance of the carrier is lowered.

Symptom : 1. Image density is lowered.
2. Toner scattering occurs.
3. Background fogging occurs.

Solution : Replace the developer material.



No frictional electrification occurs on the area where the toner is caked.

Fig. 3-211

- Magnetic roller

  - Magnetic brush development -

  The south and north poles are arranged inside the magnetic roller as shown in the right figure. The developer material forms a brush-like fluff which contacts the photoconductive drum surface.

  ↓

  This is caused by the magnetic force lines between the south and north poles.

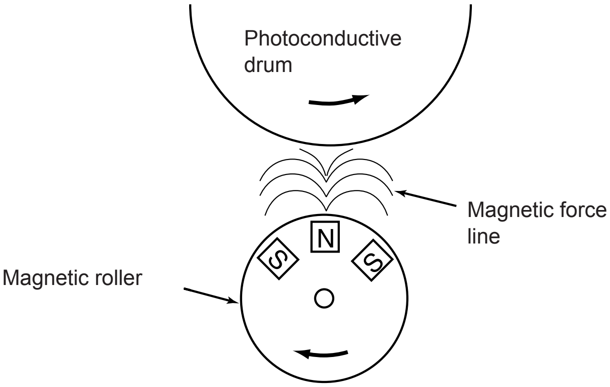


Fig. 3-212

● Additional Explanation

The life of the toner cartridge (number of output pages) varies depending on the following conditions.

1. Coverage of originals (printing image ratio of the original size) and density of original background
2. Size and density of originals
3. The existence of solid black when making prints (when a book is copied and the original cover is partially opened)
4. Temperature and humidity in the room when making prints.
5. Prints density and image quality mode
   As indicated in the figure below, the life of the toner cartridge varies depending on the copy mode and coverage of originals.
6. A full block in the figure below denotes approx. 10,000 output pages.

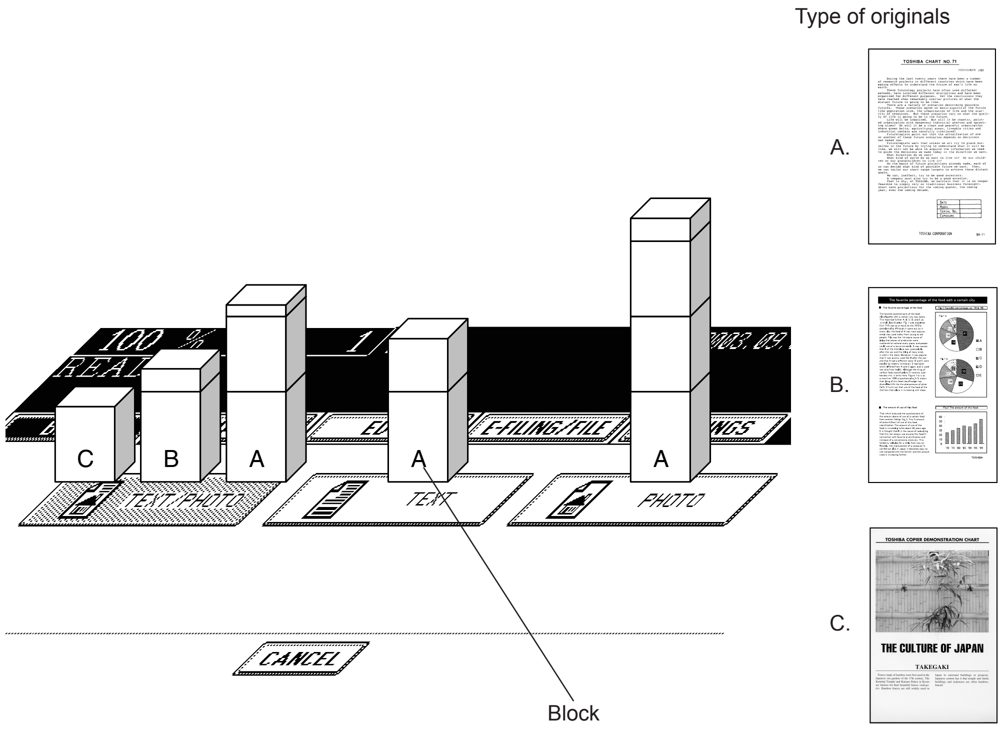

Type of originals
A.
TOSHIBA CHART NO.71
B.
C.
TOSHIBA COPIER DEMONSTRATION CHART
THE CULTURE OF JAPAN
TAKEGAKI
100 %
REAL
E-FILING/FILE
C
B
A
A
A
TEXT/PHOTO
TEXT
PHOTO
CANCEL
Block

Fig. 3-213

(6) Transfer

Transfer is the process of transferring the toner image (visible image) formed on the drum surface onto paper.

Method : A paper passing the side of the drum is charged to the opposite polarity to the that of toner by the corona discharge of the transfer charger.

↓

The toner moves from the drum surface onto the paper.

*For smooth transfer

In the transfer bias processing of this equipment, bias voltage (+580 VDC) is applied to the pre-transfer guide to prevent the charge produced by the transfer charger from flowing into the pre-transfer guide through the paper.

The corona discharge applied to the paper is normally 286 µA DC. However, to improve transferability at the trailing edge of the paper, lower output (137 µA DC) is applied to the part 10 mm from the trailing edge.

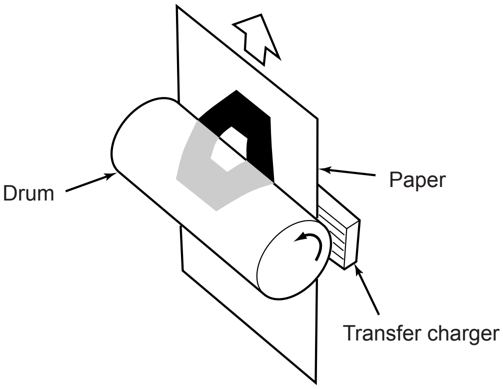

Drum
Paper
Transfer charger

Fig. 3-214

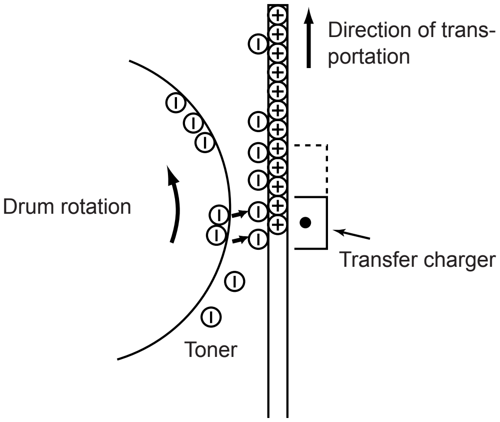

Direction of trans-portation
Drum rotation
Transfer charger
Toner

Fig. 3-215

(7) Separation

Separation is the process of separating paper which is temporarily adhering to the drum due to the static electricity during the transfer process.

Method : Apply AC voltage to which the negative DC bias is added to the separation charger.

↓

The positive charge on the paper is decreased.

↓

The static electricity (adherence power) between the paper and drum becomes weak.

↓

The paper is separated from the drum by its own stiffness and absorption by the fan.

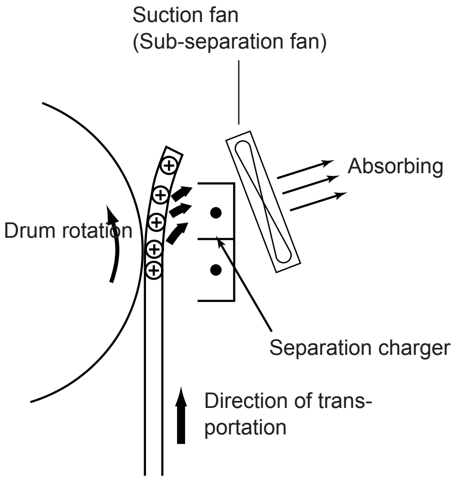

Suction fan
(Sub-separation fan)
Absorbing
Drum rotation
Separation charger
Direction of trans-portation

Fig. 3-216

* Output is controlled as follows to realizes the desirable separability and transferability.

Paper position against transfer point	Separation output
From leading edge to 10 mm from leading edge	(H) 5.5kV AC/–100 V DC
From 10 mm from leading edge to 17 mm from trailing edge	(C) 4.0kV AC/–100 V DC
From 17 mm from trailing edge to trailing edge	(L) 2.5kV AC/–100 V DC

Paper may not be separated from the drum surface because of moisture or malfunction of the transfer/separation charger during printing. As the result, the paper enters into the cleaner and causes jamming. To prevent this, a separation finger is used to forcibly separate the paper which was left around the drum.

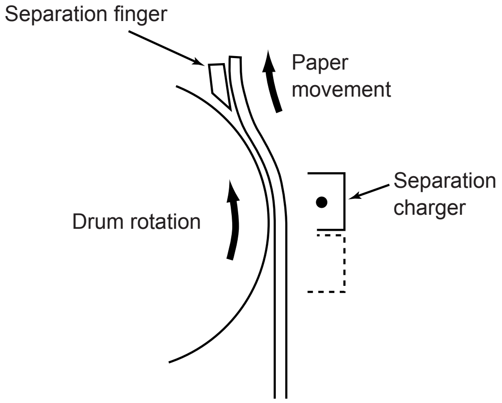

Separation finger
Paper movement
Separation charger
Drum rotation

Fig. 3-217

(8) Fusing

Fusing is the process of melting the toner on the paper and fixing it firmly on the paper.

Method : The melting point of the toner (main ingredient: resin) is 100-110°C.

↓

(Heat) Toner is melted by the heat of the surface of the fuser roller.

+

(Pressure) The pressure roller is pressed against the fuser roller by the springs to increase the adherence of the melted toner onto the paper.

↓

Heat and pressure are applied to the paper when it passes between the fuser roller and pressure roller.

||

(Fusing) The toner is fused on the paper.

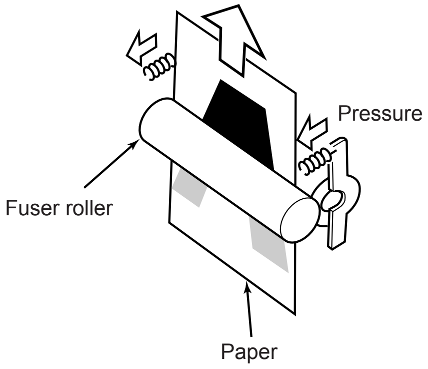

Pressure
Fuser roller
Paper

Fig. 3-218

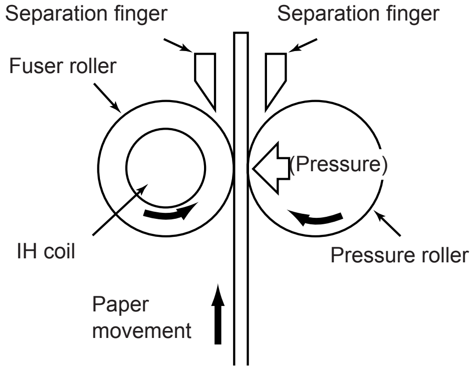

Separation finger
Separation finger
Fuser roller
(Pressure)
IH coil
Pressure roller
Paper movement

Fig. 3-219

(9) Cleaning

Cleaning is the process of removing the residual toner from the photoconductive drum.

The edge of the urethane rubber cleaning blade is pressed against the photoconductive drum surface to scrape off the residual toner on it. The toner is then caught by the recovery blade.

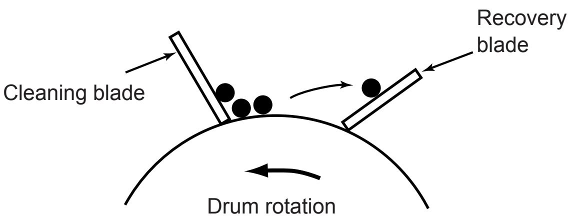


Fig. 3-220

(10) Discharging

Discharging is the process of eliminating the negative charge remaining on the photoconductive drum before the next charging process.

If the residual charge is not eliminated, the following phenomenon occurs:

The negative charge remains on the photo conductive drum.

↓

Uneven charge is applied to the drum during the next printing.

↓

The next print will have a double image.
(The preceding image appears.)

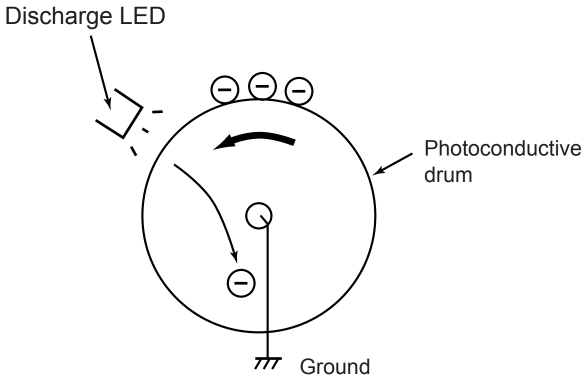


Fig. 3-221

Solution :

The entire surface of the photoconductive drum is illuminated with light by the discharge LED array.

↓

The photoconductive drum becomes electrically conductive.

↓

All of the negative charge remaining on the photoconductive drum is conducted to the ground.

↓

Preparation for the next printing is completed.

3.3 Comparison with DP4500/3500

Process	DP4500/3500	e-STUDIO350/352/353/450/452/453
1. Photoconductive drum	OD-3500 (OPCø60)	←
(1) Sensitivity	Highly sensitized/durable drum	←
(2) Surface potential	-750 V	←
2. Charging	Scorotron method	←
(1) Grid voltage	-790 V	←
3. Data writing		
(1) Light source	Semiconductor laser (Adjustment not required)	←
(2) Light amount	4.0 nJ/mm^2	4.3 nJ/mm^2
4. Development		
(1) Magnetic roller	One magnetic roller	←
(2) Auto-toner	Magnetic bridge-circuit method	←
(3) Toner supply	Toner cartridge	←
(4) Toner-empty detection	Density detection method	←
(5) Toner	T-3500, T-3500E, T-3500D	T-3520, T-3520E, T-3520D, T-3520C, T-3520T (e-SDUDIO350/352/452/453) T-4520, T-4520E, T-3520C (e-STUDIO353/453)
(6) Developer material	D-3500	D-3500, D-3500C
(7) Developer bias	DC-550 V Adjustable output (during printing)	←
	DC+150 V Fixed (others)	←
5. Transfer	Adjustable output (Constant current)	←
(1) Transfer bias	+580 V (Adjustment not required)	←
6. Separation	AC: Adjustable output (Constant voltage)	←
	DC: Adjustment not required	←
7. Discharge		
(1) Discharging position	Exposure after cleaning	←
(2) Discharge LED	Red LED	←
8. Cleaning		
(1) Method	Cleaning blade	←
(2) Recovered toner	Not reusable	←
9. Fusing		
(1) Method	Long-life fuser roller method	←
	Fuser roller:	←
	Coated with fluoroplastic (ø40)	Thin roller coated with fluoroplastic (ø40)
	Pressure roller:	←
	PFA tube roller (ø30)	←
(2) Cleaning	Cleaning roller for pressure roller	←
	(ø14)	←
(3) Heater	IH coil (Induction-heating method)	←
	Turned ON/OFF by thermistor	←

4. GENERAL OPERATION

4.1 Overview of Operation

- Operation of equipment
  - Operation during initializing, pre-running and ready
  - Copying operation
    - Drawer feed copying by [START] button
    - Bypass feed copying
    - Interrupt copying

4.2 Description of Operation

4.2.1 Warming-up

(1) Initialization

- Power ON
- IH coil ON
- Set number “1” reproduction ratio “100%” and “WAIT WARMING UP” are displayed
- Fan motors ON
- Initialization of scanning system
  – The carriage moves to the home position.
  – The carriage moves to the peak detection position.
  – The exposure lamp is turned ON.
  – Peak detection (white color is detected by the shading correction plate)
  – The exposure lamp is turned OFF.
- “READY (WARMING UP)” is displayed

(2) Pre-running operation

The pre-running operation is started when the temperature of the fuser roller surface reaches a certain temperature.

- Fuser roller rotated
- Drum rotated
  – The main motor is turned ON.
- Initialization of feeding system
  – Each drawer tray goes up.
- Pre-running operation stops after five seconds.

(3) When the surface temperature of the fuser roller becomes sufficient for fusing,

- “READY” is displayed.

4.2.2 Ready state (ready for copying)

- Buttons on the control panel enabled
- When no button is pressed for a certain period of time,
  – Set number “1” and reproduction ratio “100%” are displayed. Equipment returns to the normal ready state.

4.2.3 Drawer feed copying (Upper drawer paper feeding)

(1) Press the [START] button
- “READY” changes to “COPYING”
- Exposure lamp ON
- Scan motor ON → carriages -1 and -2 move forward
- Polygonal motor rotates in high speed
- Main motor and exit motor ON
  – The drum, fuser unit, developer unit and exit roller are driven.

(2) Drawer paper feeding
- Main charger, developer bias and discharge LED ON
- Fans are rotated in high speed
- Drawer feed clutch ON
  – The pickup roller, feed roller, separation roller and transport roller start to rotate.
- Paper reaches the upper drawer feed sensor
  – The upper drawer feed sensor is turned ON.
- Paper reaches the registration roller.
  – The registration sensor is turned ON and aligning is performed.
- Drawer feed clutch OFF after a certain period of time

(3) After the carriage operation:
- Registration clutch ON after a certain period of time → paper is transported to the transfer area.
- Copy counter operates

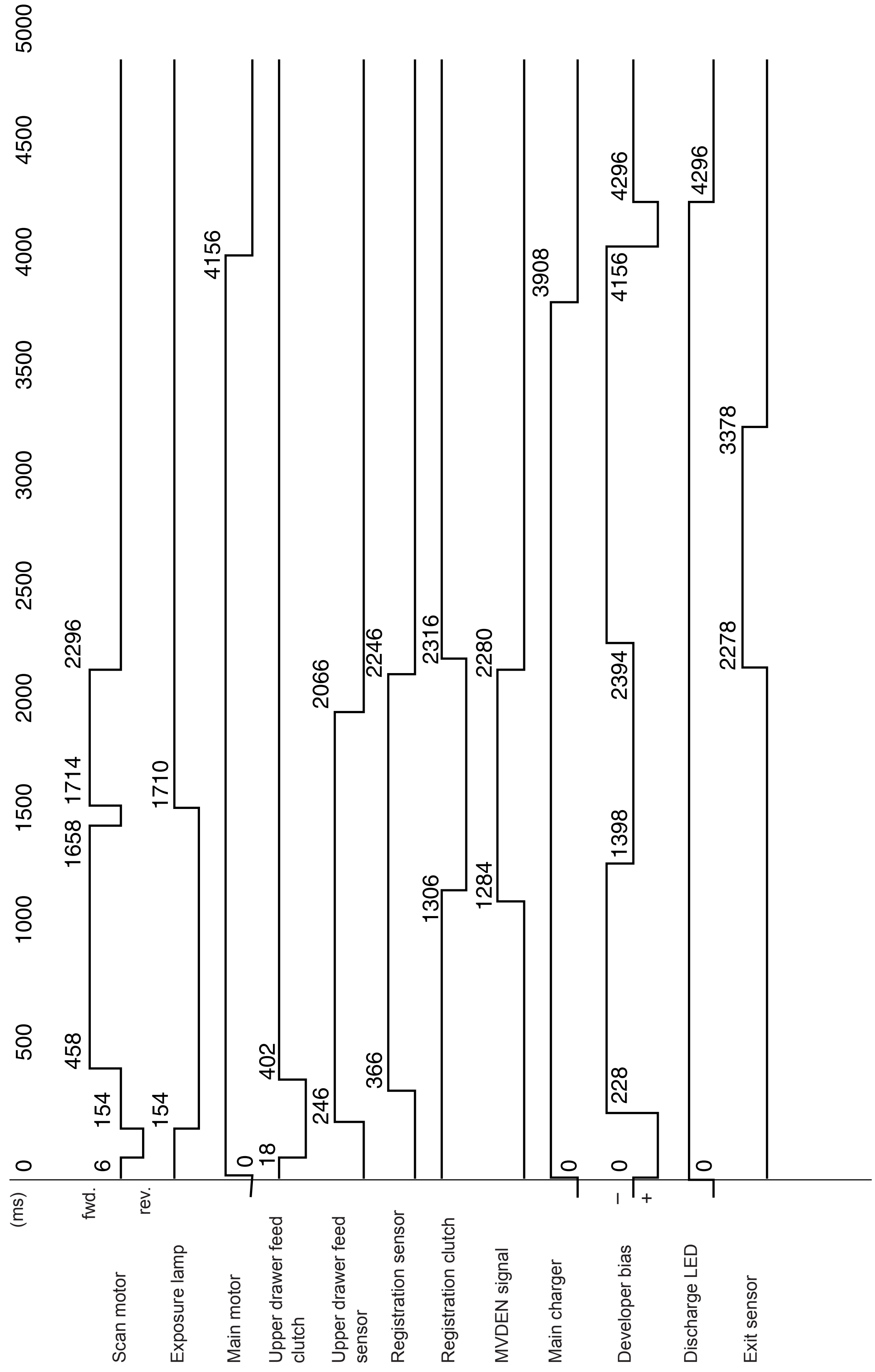
(4) After the registration clutch is turned ON:
- Transfer charger ON after a certain period of time

(5) Completion of scanning
- Scan motor OFF
- Exposure lamp OFF
- Registration clutch OFF (after the trailing edge of the paper passed the registration roller)
- “READY (PRINTING)” is displayed

(6) Paper exit

- Exit sensor detects the trailing edge of the paper
- Main charger, developer bias and discharge LED OFF
- Polygonal motor, main motor and exit motor OFF
- Drum, fuser unit and developer unit stop
- Fans return to the ready rotation
- “READY” is displayed and the equipment enters the ready mode

Timing chart for copying one A4 size sheet fed from the upper drawer



4.2.4 Bypass feed copying

(1) Insert a sheet of paper into the bypass tray.
- Bypass paper sensor ON
  – "Ready for bypass feeding" is displayed.
- Carriages move to the home position

(2) Press the [START] button
- "Ready for bypass feeding" changes to "COPYING"
- Exposure lamp ON
- Scan motor ON → Carriages -1 and -2 move forward
- Polygonal motor rotates in high speed
- Main motor and exit motor ON
  – The drum, fuser unit, developer unit and exit roller are driven.

(3) Bypass feeding
- Main charger, developer bias and discharge LED ON
- Fans are rotated in high speed
- Bypass feed clutch ON
  – The bypass pickup roller and bypass feed roller start to rotate.
  – The bypass pickup roller is lowered.
- Aligning operation
- Paper reaches the registration roller
- After a certain period of time, the bypass feed clutch OFF

(4) Hereafter, the operation (3) through (6) of "4.2.3. Drawer feed copying" is repeated.

4.2.5 Interruption copying

(1) Press the [INTERRUPT] button
- LED "INTERRUPT" ON
- Copying operation in progress is temporarily stopped
- Carriages -1 and -2 return to appropriate positions
- "Job interrupted job 1saved" is displayed.
- Automatic density and reproduction ratio 100% are set (The set number remains the same)

(2) Select the desired copy condition

(3) After the interruption copying is finished:
- LED "INTERRUPT" OFF by pressing the [INTERRUPT] button
- Equipment returns to the status before the interruption
- "Ready to resume job 1" is displayed

(4) Press the [START] button
The copying operation before the interruption is resumed.

4.3 Detection of Abnormality

When something abnormal has occurred in the equipment, the symbols corresponding to the type of abnormality are displayed.

4.3.1 Types of abnormality

A) Abnormality cleared without turning OFF the door switch
  (1) Add paper
  (2) Paper misfeed in bypass
B) Abnormality not cleared without turning OFF the door switch
  (1) Misfeed in equipment
  (2) Add toner
  (3) Developer unit not installed properly
  (4) Toner bag replacement
C) Abnormality not cleared without turning OFF the main switch
  (1) Call for service

4.3.2 Description of abnormality

A-1) Add paper

Drawer empty sensor detects the presence or absence of paper.

[When drawer is not installed]
No drawer detected
↓
Tray not going up (drawer empty sensor OFF)
↓
“Add paper” displayed
↓
[START] button disabled

[When drawer is installed]
Drawer detected
↓
Tray going up (drawer empty sensor OFF)
↓
“Add paper” displayed
↓
[START] button disabled

- When the power is turned ON or the LCF drawer is inserted (when the power is turned ON or equipment drawer / PFP drawers are inserted), LCF performs initialization.

  ↓

  Detects the presence of paper

  Tray-up motor ON – The tray goes up

  At this time, the tray-up sensor and LCF empty sensor are OFF.

  → When the tray-up sensor is not turned ON in a fixed period of time, it means that the tray is in abnormal condition.

  → “Add paper” is displayed regardless of presence/absence of paper.

  ↕

  Cleared by turning the power ON / OFF

  → Tray-up sensor is turned ON in a fixed period of time.

  – The tray motor stops.

  At this time, if the empty sensor is ON: It is judged that there is paper.

  OFF: It is judged that there is no paper.

  ↓

  Drawer area of the illustration blinks (When the drawer is selected)

- When the paper in the drawer runs out during copying,

  → The tray-up sensor turned OFF

  → The tray-up motor turned ON → Tray goes up

  The tray-up sensor turned ON → Tray-up motor stopped.

- Empty sensor turned OFF during the copying in spite of the tray-up sensor is ON

  ⇩

  It is judged that there is no paper.

  ↓

  Drawer area of the illustration blinks (When the drawer is selected)

  ↓

  The copying operation is stopped.

A-2) Bypass misfeeding ( )

- During bypass feeding

Bypass feed clutch ON

↓

Registration sensor ON

* Registration sensor is not turned ON in a fixed period of time (E120)

↓

Bypass misfeeding (E120)

↓

Bypass misfeeding symbol is displayed ( )

↓

Copying operation is disabled

↓

Solution: The bypass paper sensor is turned OFF by removing the paper from the bypass tray.

A-3) Set key copy counter

- When the key copy counter (optional) is pulled out from the equipment which installs it:

"Set key copy counter" displayed

↓

Copying operation disabled

- When the counter is pulled out during copying:

Copying is stopped when the key copy counter is pulled out.

B-1) Misfeed in equipment ( )

- Exit sensor detects jamming of the leading edge of paper.

↓

Registration clutch ON

↓ Less than 1.056 sec.

Exit sensor ON

If the exit sensor is not turned ON after 1.056 seconds,

↓

Paper jam (E010) → The copying operation is stopped.

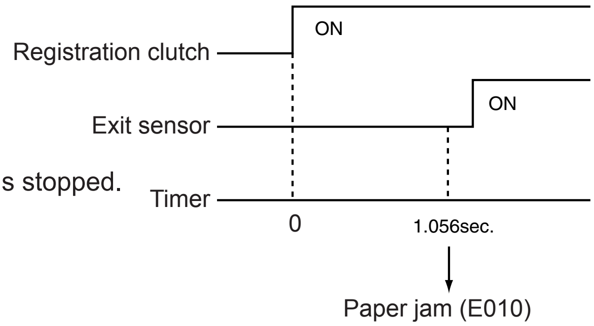


Fig. 4-301

- Exit sensor detects jamming of the trailing edge of paper.

  ↓

  Registration clutch OFF

  ↓ Less than 1.116 sec.

  Exit sensor OFF
  If the exit sensor is not turned OFF after 1.116 seconds,

  ↓

  Paper jam (E020) → The copying operation is stopped.

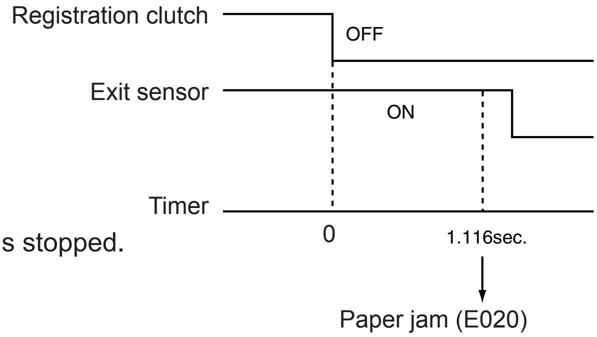


Fig. 4-302

- Immediately after the power ON

  ↓

  Any of all sensors on paper transport path detects paper (ON)

  ↓

  Paper jam (E030)

- Front cover is opened during copying

  ↓

  Paper jam (E410)

- Registration sensor detects jamming of the leading edge of paper:

  ↓

  Registration sensor is not turned ON in a fixed period of time after the leading edge of paper passed the transport roller.

  ↓

  Paper jam (E120, E200, E210, E300, E330 and E3C0)

- During paper feeding from ADU:
  Registration sensor is not turned ON in a fixed period of time after the ADU clutch is turned ON.

  ↓

  Paper jam (E110)

- During paper transporting from ADU:
  ADU entrance/exit sensors do not detect the paper at the fixed timing

  ↓

  Paper jam (E510 or E520)

- During paper feeding from the equipment or PFP:
  Registration sensor is not turned ON in a fixed period of time after the feed clutch is turned ON
  ↓
  Paper jam (E220, E310, E320, E340–E360, E3D0 and E3E0: Error code differs depending on the paper source.)

B-2) Add toner ( )
Toner density becomes low
↓
Auto-toner sensor detects the absence of the toner
↓
Control circuit → “Add toner” displayed: the copying operation disabled
Solution: Open the front cover and replace the toner cartridge with a new one.
Toner is supplied → copying operation enabled.

B-3) Developer unit not installed properly
Disconnection of the connectors of the developer unit
↓
“Developer unit not installed” is displayed.
Solution: Connect the connectors of the developer unit and close the front cover.

B-4) Dispose of used toner ( )

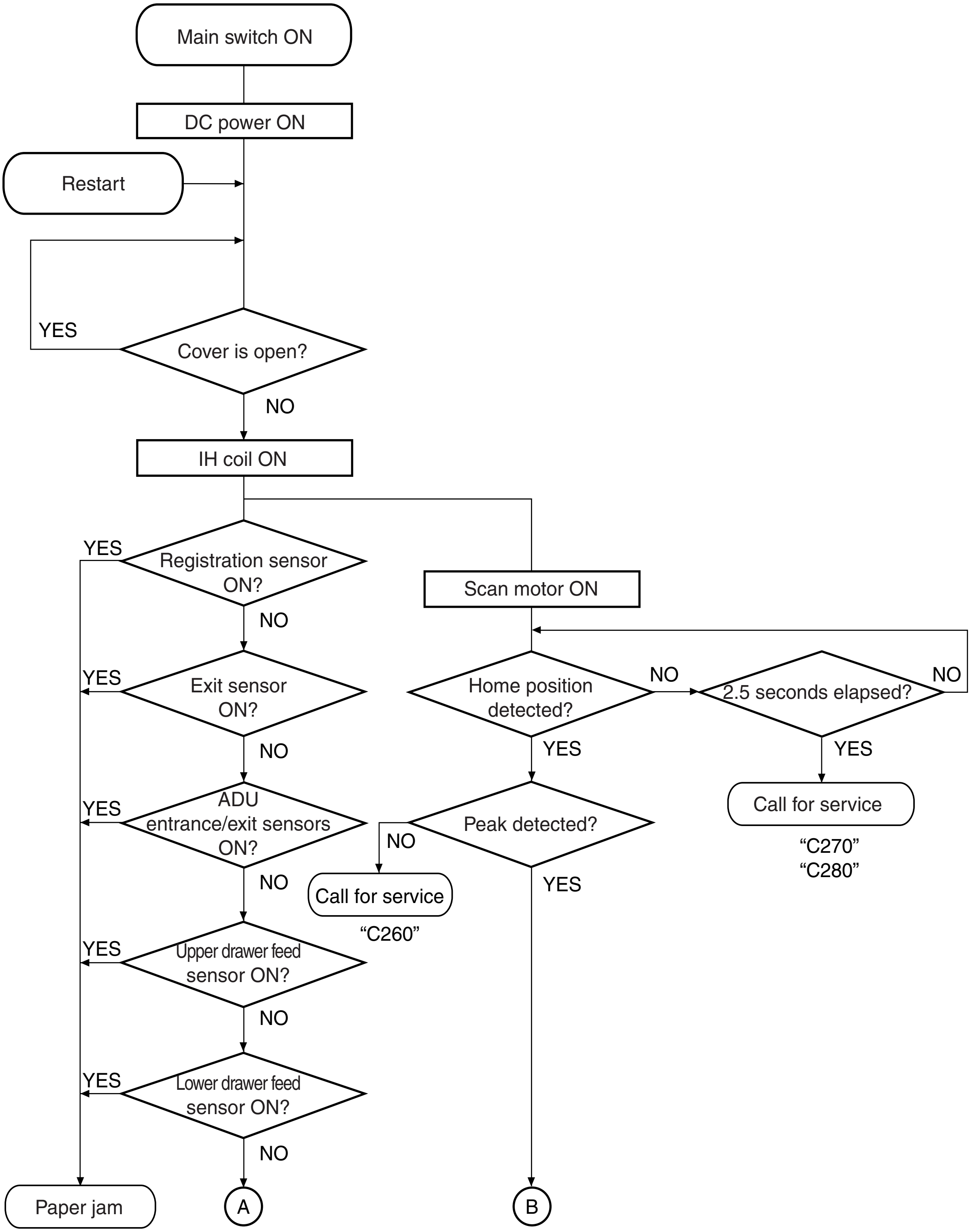
- Toner bag becomes full of toner
  ↓
  Toner recovery auger shifts to the rear side: Toner bag full detection sensor (1) ON or Toner bag detection sensor (2) ON
  ↓
  “Dispose of used toner” is displayed.

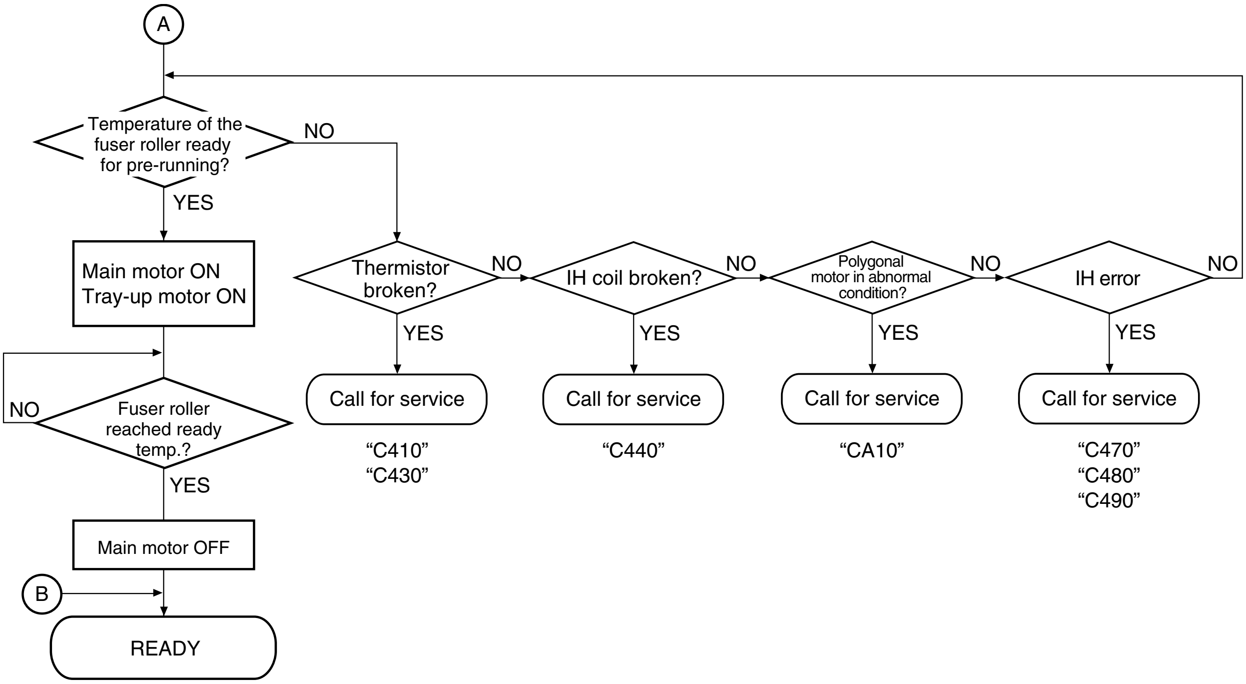
- Toner bag full detection sensor ON during printing
  ↓
  Printing is stopped after the paper being printed is exited.
  Solution: Replace the toner bag with a new one and close the front cover.

C-1) Call for service
Error code is displayed instead of the set number by pressing the [CLEAR] button and [8] button simultaneously when the “Call for service” is blinking.
Refer to the error code table in the Service Handbook.

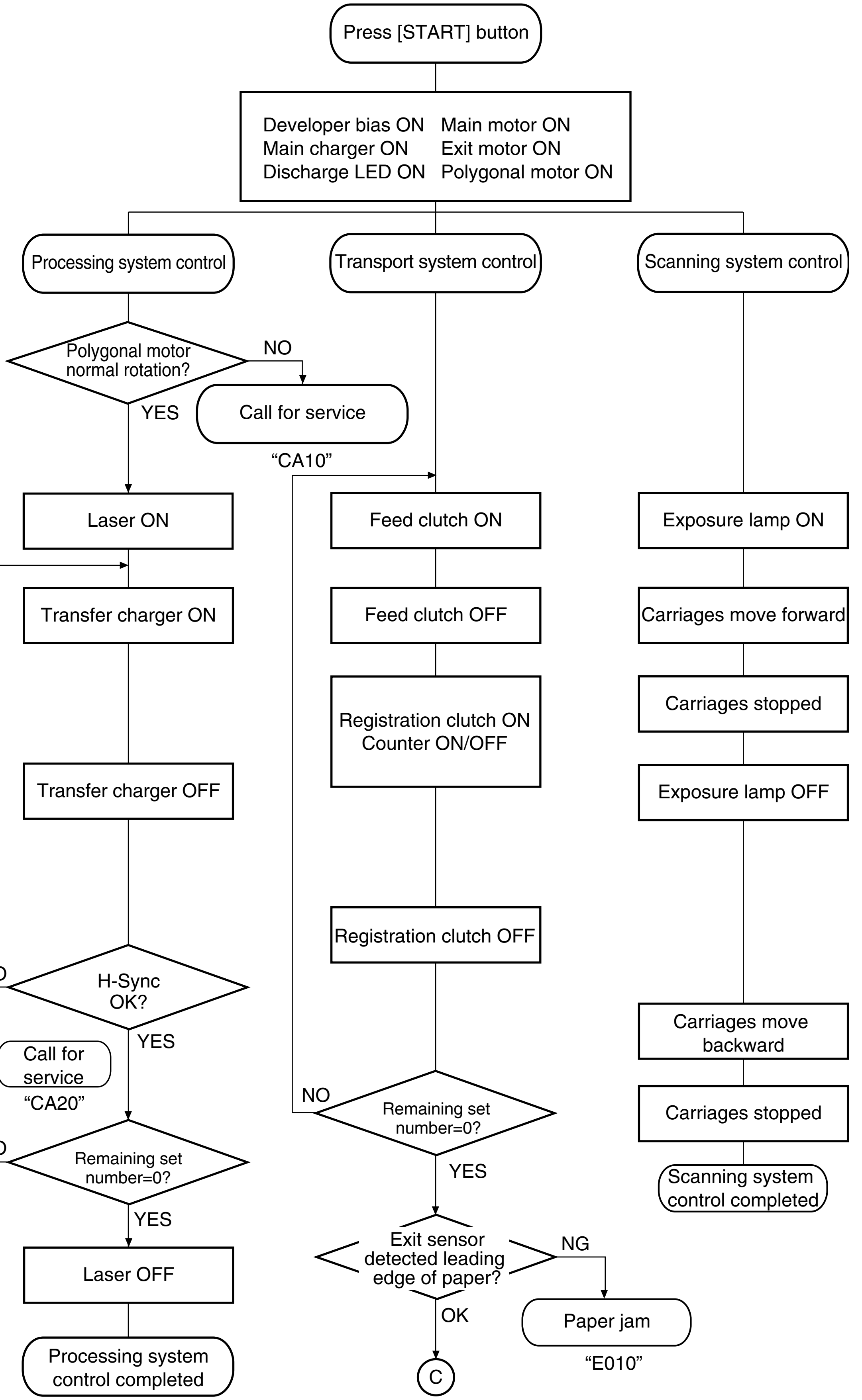
4.4 Flow Chart

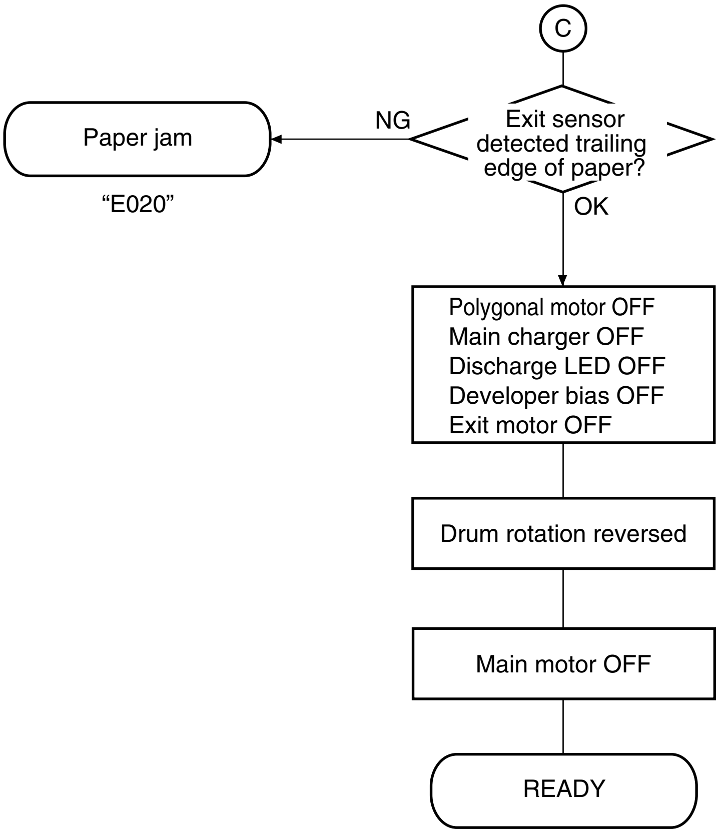
4.4.1 Immediately after the power is turned ON


Main switch ON
DC power ON
Restart
YES
Cover is open?
NO
IH coil ON
YES
Registration sensor ON?
NO
Scan motor ON
YES
Exit sensor ON?
NO
Home position detected?
NO
2.5 seconds elapsed?
NO
YES
YES
Call for service
"C270"
"C280"
YES
ADU entrance/exit sensors ON?
NO
Peak detected?
NO
Call for service
"C260"
YES
YES
Upper drawer feed sensor ON?
NO
YES
Lower drawer feed sensor ON?
NO
Paper jam
A
B


A
Temperature of the fuser roller ready for pre-running?
NO
YES
Main motor ON
Tray-up motor ON
Thermistor broken?
NO
IH coil broken?
NO
Polygonal motor in abnormal condition?
NO
IH error
NO
YES
YES
YES
YES
Call for service
Call for service
Call for service
Call for service
"C410"
"C430"
"C440"
"CA10"
"C470"
"C480"
"C490"
NO
Fuser roller reached ready temp.?
YES
Main motor OFF
B
READY

4.4.2 Automatic paper feed copying


Press [START] button
Developer bias ON
Main charger ON
Discharge LED ON
Main motor ON
Exit motor ON
Polygonal motor ON
Processing system control
Transport system control
Scanning system control
Polygonal motor normal rotation?
NO
Call for service
"CA10"
YES
Laser ON
Transfer charger ON
Transfer charger OFF
NO
H-Sync OK?
YES
Call for service
"CA20"
NO
Remaining set number=0?
YES
Laser OFF
Processing system control completed
Feed clutch ON
Feed clutch OFF
Registration clutch ON
Counter ON/OFF
Registration clutch OFF
NO
Remaining set number=0?
YES
Exit sensor detected leading edge of paper?
NG
Paper jam
"E010"
OK
C
Exposure lamp ON
Carriages move forward
Carriages stopped
Exposure lamp OFF
Carriages move backward
Carriages stopped
Scanning system control completed


C
Exit sensor detected trailing edge of paper?
NG
Paper jam
"E020"
OK
Polygonal motor OFF
Main charger OFF
Discharge LED OFF
Developer bias OFF
Exit motor OFF
Drum rotation reversed
Main motor OFF
READY

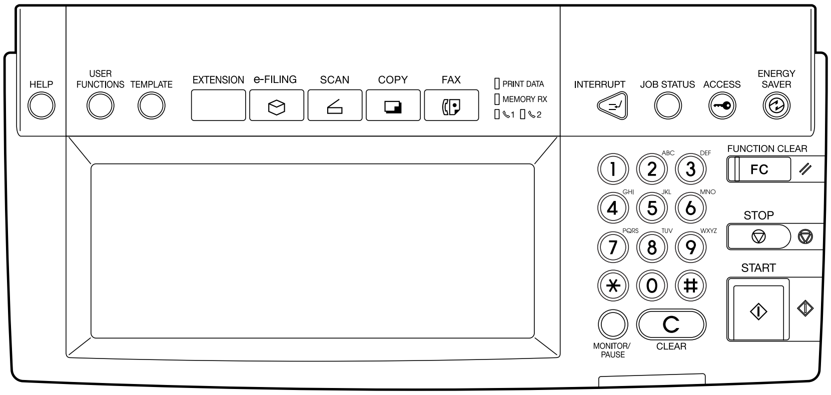
5. CONTROL PANEL

5.1 Control Panel and Display Panel

The control panel consists of button switches and touch-panel switches to operate equipment and select various modes, and LEDs and an LCD to display the state of the equipment or the messages.

When the operator’s attention is required, graphic symbols appear with messages explaining the condition of the equipment in the LCD panel.

This equipment has a movable control panel which enables to adjust its angle to the operator. It also has improved its operatability and visibility with the enlarged LCD panel.


HELP
USER FUNCTIONS
TEMPLATE
EXTENSION
e-FILING
SCAN
COPY
FAX
PRINT DATA
MEMORY RX
1
2
INTERRUPT
JOB STATUS
ACCESS
ENERGY SAVER
FUNCTION CLEAR
FC
1
2
ABC
3
DEF
4
GHI
5
JKL
6
MNO
7
PQRS
8
TUV
9
WXYZ
*
0
#
STOP
START
C
MONITOR/ PAUSE
CLEAR

[Control Panel Outside View]

Fig. 5-101

5.2 Items Shown on the Display Panel

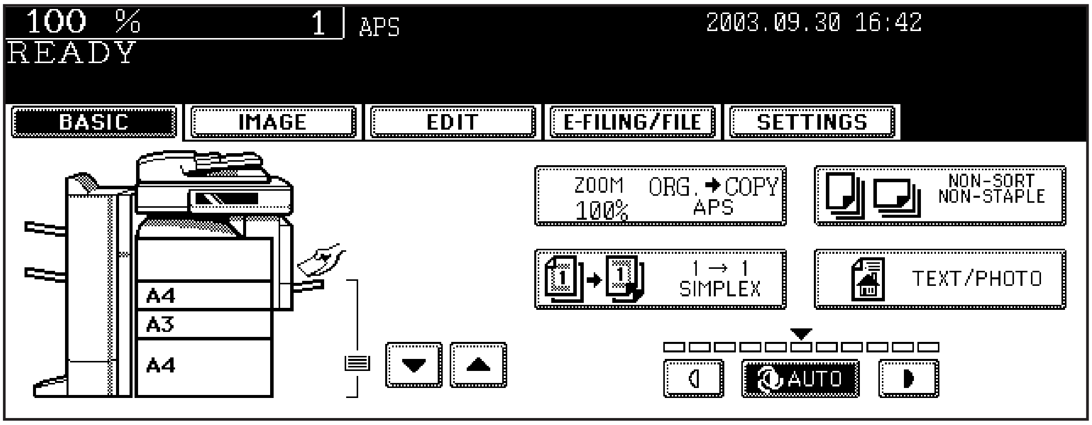

100 %
1
APS
2003.09.30 16:42
READY
BASIC
IMAGE
EDIT
E-FILING/FILE
SETTINGS
ZOOM
100%
ORG. ➔ COPY
APS
NON-SORT
NON-STAPLE
1 → 1
SIMPLEX
TEXT/PHOTO
A4
A3
A4
AUTO

Fig. 5-201

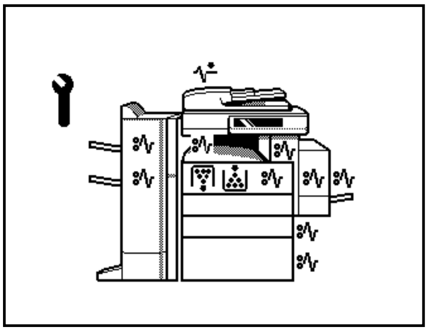


Fig. 5-202

5.2.1 Display

No.	Message	State of equipment	Note
1	-	Power is OFF (at Sleep Mode)	Press [START] button or [FUNCTION] button to clear
2	Saving energy - press START button	At Energy Saving Mode	Press [START] button to clear
3	Wait Warming Up	Scanner warming up - Displayed until the equipment becomes ready to start scanning	Auto Start can be set
4	Wait Warming Up Auto Start	Scanner warming up - Displayed when Auto Start is set	Press [STOP] button to clear the Auto Start.
5	WAIT	Displayed when performing the controlling function to keep the equipment at the best condition	
6	Wait adding toner	Supplying toner - Equipment becomes the toner supply state	Recovers when the toner supply has finished
7	Performing Auto Calibration	Displayed at image quality control	Recovers when the image quality control has finished
8	READY	Ready for copying - Waiting for the operation	
9	READY Press START button to copy	Copying job interrupted	Press [START] button to resume copying or press [MEMORY CLEAR] button to delete the job
10	READY (WARMING UP)	Scanner warming up - Ready to scan the original	
11	READY (PRINTING)	Printing out the data - Scanning is enabled	
12	READY (ADDING TONER)	Supplying toner - Scanning is enabled	
13	READY (INNER TRAY FULL)	Receiving tray in the equipment is full - Scanning is enabled	- When the bridge unit is installed - Resumes printing by removing papers from the tray
14	READY (CHECK STAPLER)	No staples in finisher - Scanning is enabled	Cleared by supplying the staples
15	READY (CHECK STAPLER)	Stapling jam occurred in finisher	
16	READY (CHECK SADDLE STITCH STAPLER)	No staples in saddle stitcher - Scanning is enabled	Cleared by supplying staples
17	READY (ADD PAPER) Press JOB STATUS button	No paper in drawer - Scanning is enabled	Cleared by supplying papers
18	READY (FINISHER FULL)	Finisher is full of paper - Scanning is enabled	Resumes printing by removing paper from the finisher
19	READY (HOLE PUNCH DUST BIN IS FULL)	Punching dust box is full - Scanning is enabled	Resumes printing by removing punching dust from the dust box

No.	Message	State of equipment	Note
20	READY (SADDLE STITCH TRAY FULL)	Saddle stitcher tray is full of paper - Scanning is enabled	
21	READY (CHANGE DRAWER TO CORRECT PAPER SIZE)	Incorrect paper size setting	
22	Ready for bypass feeding	Paper is set on the bypass tray	
23	COPYING	At the copying state	
24	Auto Start	Auto Start is set during printing	Cleared by pressing [RESET] button or [STOP] button
25	Close Large Capacity Feeder	LCF drawer is not installed when feeding from LCF is set	Cleared by installing LCF drawer
26	Close Large Capacity Feeder Door	LCF cover is open when feeding from LCF is set	Cleared by closing the cover
27	Place Doc. Feeder in the down position	RADF is open when original is placed on RADF	Cleared by closing RADF
28	Insert key copy counter	Key copy counter not inserted	Cleared by inserting key copy counter
29	Place originals in the document feeder	Displayed when the conditions are set and START button is pressed with no original placed	Cleared by setting the original
30	Change direction of original	Displayed when the direction of original placed is different from the setting	
31	Place last %d originals in doc. feeder entrance tray	Paper jam occurred during copying (RADF scanning)	
32	Add paper	Displayed when the paper in selected drawer is running out	
33	Cannot duplex this size	Displayed when the paper size which is not specified for duplex copying is set	
34	Cannot use this media type	Displayed when the paper size which is not specified for the functions such as stapling or hole punching is set	
35	Copy size: A4/LT only	Displayed when the paper size which is not specified for “Book-type duplex copying” or “Dual-page” is set	
36	Copy size: A4/LT and A4-R/LT-R	Displayed when the paper size which is not specified for “Rotate Sort”	
37	CHANGE DRAWER TO CORRECT PAPER SIZE	Displayed when the selected paper size is not in the drawer	
38	Change drawer to correct media type	Displayed when the selected media type is not in the drawer	
39	Select a paper size for bypass feeding	Displayed when paper size needs to be specified for bypass feeding such as duplex copying	

No.	Message	State of equipment	Note
40	Place the blank sheets in bypass tray and select the paper size	Displayed when no paper is in the selected feeder at Cover Copying Mode	
41	Place the blank sheets in the same direction as the originals	Displayed when the direction of cover page is different from that of other pages at Cover Copying Mode	
42	Place the same size blank sheets as the originals	Displayed when the paper size of cover page is different from that of other pages at Cover Copying Mode	
43	Place insertion sheets in the bypass tray and select the paper size	Displayed when no insertion sheet is in the selected drawer at Sheet Insertion Mode	
44	Select the same size insert1 sheets as the originals	Displayed when the size of insertion sheet (sheet 1) is different from that of other pages at Sheet Insertion Mode	
45	Select the same size insert2 sheets as the originals	Displayed when the size of insertion sheet (sheet 2) is different from that of other pages at Sheet Insertion Mode	
46	Set insert1 sheets in the same direction as the originals	Displayed when the direction of insertion sheet (sheet 1) is different from that of other pages at Sheet Insertion Mode	
47	Set insert2 sheets in the same direction as the originals	Displayed when the direction of insertion sheet (sheet 2) is different from that of other pages at Sheet Insertion Mode	
48	Set transparency film in A4/LT direction	Displayed when the selected paper size is other than A4/LT at OHP mode	
49	CHECK PAPER IN LARGE CAPACITY FEEDER	Papers in LCF are set incorrectly	
50	CANNOT PUNCH THIS SIZE PAPER	Displayed when the selected paper size is not specified for hole punching	
51	Remove paper from the finisher	Displayed when the paper sizes are mixed at Staple Sorting Mode	
52	Cannot staple this size	Displayed when the paper size is not specified for stapling at Staple Sorting Mode	
53	Remove paper from the saddle stitch unit	Finisher is full of papers	
54	Examine stapler	Trouble in the stapler unit in finisher	
55	Check staple cartridge	No stapler in finisher section	
56	Check staple cartridge in the saddle stitch unit	No stapler in saddle stitch unit	
57	Job interrupted job 1 saved	Interrupt copying is accepted	
58	Ready to resume job 1	Interrupt copying is cancelled (finished)	

No.	Message	State of equipment	Note
59	Cannot use AMS mode	Displayed when reproduction ratio is set to be over 200% at AMS Mode on RADF	Set the reproduction ratio 200% or below manually
60	More than 200% is not available	Displayed when reproduction ratio is set manually to be over 200% on RADF	Set the reproduction ratio 200% or below
61	Updated the template setting	Displayed when the template stored is recalled by pressing [TEMPLATE] button	
62	Enter Department Code	Displayed when a button is pressed while the department management setting is available	
63	Cannot copy Check DEPARTMENT COUNTER	Displayed when the number of printouts exceeds the limit number of department counter	
64	Not enough memory to store original(s) Will you print out stored originals?	Displayed when confirming the user to print out the data as much as stored at memory - full state	
65	Not enough memory to store original(s) Will you send stored originals in?	Displayed when confirming the user to send the FAX data as much as stored at memory - full state	Displayed only in FAX Function
66	Not enough memory to store original(s) Will you save stored originals in?	Displayed when confirming the user to save the scanning data as much as stored at memory-full state	Displayed only in FAX Function
67	The number of originals exceeds the limits Will you copy stored originals?	Displayed when confirming the user to print out the data as much as stored at memory-full state	
68	The number of originals exceeds the limits. Will you send stored originals?	Displayed when confirming the user to send the FAX data as much as stored at memory-full state	Displayed only in FAX Function
69	The number of originals exceeds the limits. Will you save stored originals?	Displayed when confirming the user to save the scanning data as much as stored at memory-full state	Displayed only in Scanning Function
70	Install new toner cartridge	No toner in the cartridge	Displayed when toner is running out. Copying not enabled
71	Time for periodic maintenance	PM cycle - Displayed at the time for maintenance - Copying is available	Maintenance and inspection are performed by qualified service technician.
72	READY (CHANGE DRAWER TO CORRECT MEDIA TYPE)	Displays when the printing is stopped because of media type mismatch	
73	PRESS [BASIC] and select normal paper size	Displays the warning that the copy is not enabled when any drawer but bypass feed is selected at Cover Sheet Mode or Sheet Insertion Mode.	

No.	Message	State of equipment	Note
74	Misfeed in copier	Paper jam in the equipment - Displayed when paper jam occurred in the equipment	Remove the paper in the equipment according to the messages displayed on the panel.
75	Call for service	Displayed when motor, sensor, switch, etc. do not work properly	Turn OFF the power and solve the problem, then turn ON the power.
76	Please try again after a while	Displayed when the Department Code can no be keyed in immediately after power-ON.	Leave it for a while and key in the code again.
77	Set standard size	Displayed when the paper size which is not acceptable is set (depends on the setting)	Reset the paper size.

5.3 Relation between the Equipment State and Operator’s Operation

	During READY status	During warming-up	Auto job start reserved	Scanning original/ Scanning original and printing out the copy	Printing out the copy	During paper jam	When interrupting	When displaying HELP screen	During energy saving mode
Press [ENERGY SAVER] button	Switches to energy saving mode	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Switches to energy saving mode	Energy saving mode is cleared and displays BASIC screen
Press [ACCESS] button	Displays department code entry screen (when department management is available)	Displays department code entry screen (when department management is available)	Display not changed	Display not changed	Displays department code entry screen (when department management is available)	Display not changed	Displays department code entry screen (when department management is available)	Displays department code entry screen (when department management is available)	Display not changed
Press [JOB STATUS] button	Displays print job list screen	Display not changed	Display not changed	Displays print job list screen	Displays print job list screen	Display not changed	Displays print job list screen	Displays print job list screen	Display not changed
Press [INTERRUPT] button	Switches to interrupt mode	Display not changed	Display not changed	Display not changed (LED blinking)	Display not changed (LED blinking)	Display not changed	Returns to the status before interrupting	Switches to interrupting mode	Display not changed
Press [FUNCTION CLEAR] button after setting the copy mode	Copy mode is cleared after the copy mode is set	Copy mode is cleared after the copy mode is set	Auto job start cancelled	Display not changed	Copy mode is cleared after the copy mode is set	Display not changed	Copy mode is cleared after the copy mode is set	Displays BASIC screen after the copy mode is set and then cancelled	Display not changed
Press [STOP] button	Display not changed	Display not changed	Auto job start cancelled	Scanning or printing out stops, and “READY Press START to copy“ and “MEMORY CLEAR” are displayed	Printing out stops, and “READY Press START to copy“ and “MEMORY CLEAR” are displayed	Display not changed	Display not changed	Display not changed	Display not changed
Press [CLEAR] button after setting the copy mode	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Display not changed	Display not changed	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Display not changed	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Number of printouts changes to 1 while the setting remains unchanged after the copy mode is set	Display not changed
Press [CLEAR] button after keying in numbers (digital keys)	Number keyed in changes to 1 after being entered	Number keyed in changes to 1 after being entered	Display not changed	Display not changed	Number keyed in changes to 1 after being entered	Display not changed	Number keyed in changes to 1 after being entered	Number keyed in changes to 1 after being entered	Display not changed
Press [MONITOR/ PAUSE]	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed
Press [FAX] button	Displays FAX screen	Display not changed	Display not changed	Display not changed	Displays FAX screen	Display not changed	Display not changed	Displays FAX screen	Displays FAX screen
Press [COPY] button	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Displays COPY screen
Press [SCAN] button	Displays SCAN screen	Display not changed	Display not changed	Display not changed	Displays SCAN screen	Display not changed	Display not changed	Displays SCAN screen	Displays SCAN screen
Press [e-FILING]	Displays e-FILING screen	Display not changed	Display not changed	Display not changed	Displays e-FILING screen	Display not changed	Display not changed	Displays e-FILING screen	Displays e-FILING screen
Press [EXTENSION] button	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed	Display not changed
Press [TEMPLATE] button	Displays TEMPLATE screen	Display not changed	Display not changed	Display not changed	Displays TEMPLATE screen	Display not changed	Display not changed	Displays TEMPLATE screen	Display not changed
Press [USER FUNCTIONS] button	Displays USER FUNCTIONS screen	Display not changed	Display not changed	Display not changed	Displays USER FUNCTIONS screen	Display not changed	Display not changed	Displays USER FUNCTIONS screen	Display not changed
Press [HELP] button	Displays HELP screen	Displays HELP screen	Display not changed	Display not changed	Displays HELP screen	Display not changed	Displays HELP screen	Switches to the screen previously displayed	Display not changed
Press [START] button with the original set on RADF	Displays “COPYING”	“Wait Warming Up Auto Start” is displayed	Display not changed	Display not changed	Displays “COPYING” and RADF starts feeding	Display not changed	Displays “COPYING” and RADF starts feeding	Displays “COPYING” and RADF starts feeding	Energy saving mode is cleared and displays BASIC screen

5.4 Description of Operation

5.4.1 Dot matrix LCD circuit

(1) Structure

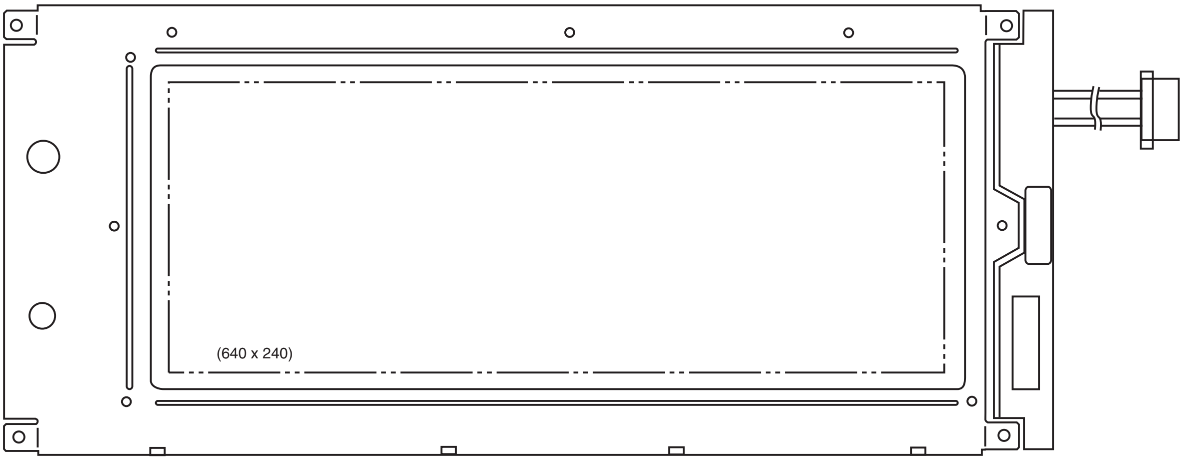


Fig. 5-401

The LCD panel is an STN blue mode transmissive type LCD with 640x240-dot display capacity. It consists of a driver LSI, frame, printed circuit board, and lateral type CCFL backlight.

* STN: Super Twisted Nematic

* CCFL: Cold Cathode Fluorescent Lamp

(2) Block diagram

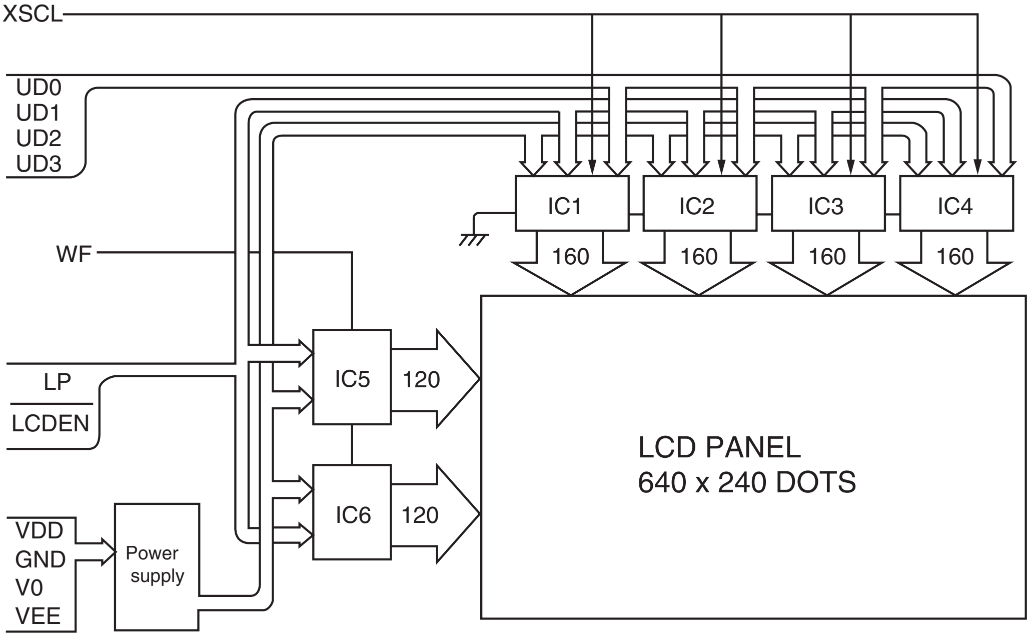

XSCL
UD0
UD1
UD2
UD3
WF
LP
LCDEN
VDD
GND
V0
VEE
Power supply
IC1
IC2
IC3
IC4
160
160
160
160
IC5
120
IC6
120
LCD PANEL
640 x 240 DOTS

Fig. 5-402

(3) System diagram

Signals flowing between the control panel and the system board are indicated in the chart below.

When the panel processing CPU detects that the control panel is operated, the operational contents are transmitted to the System board through the serial data. The state of the equipment and the messages from the System board are received by the LCD controller and then displayed on the LCD.

The LED and buzzers are switched to ON/OFF with the signals from the System control PC board. The control methods of the LED and buzzers differ depending on the model:

e-STUDIO350/450:	They are switched to ON/OFF with the control signals from the System control PC board.
e-STUDIO352/353/452/453:	They are switched to ON/OFF with the signals output from the panel processing CPU, based on serial data transmitted from the System control PC board.

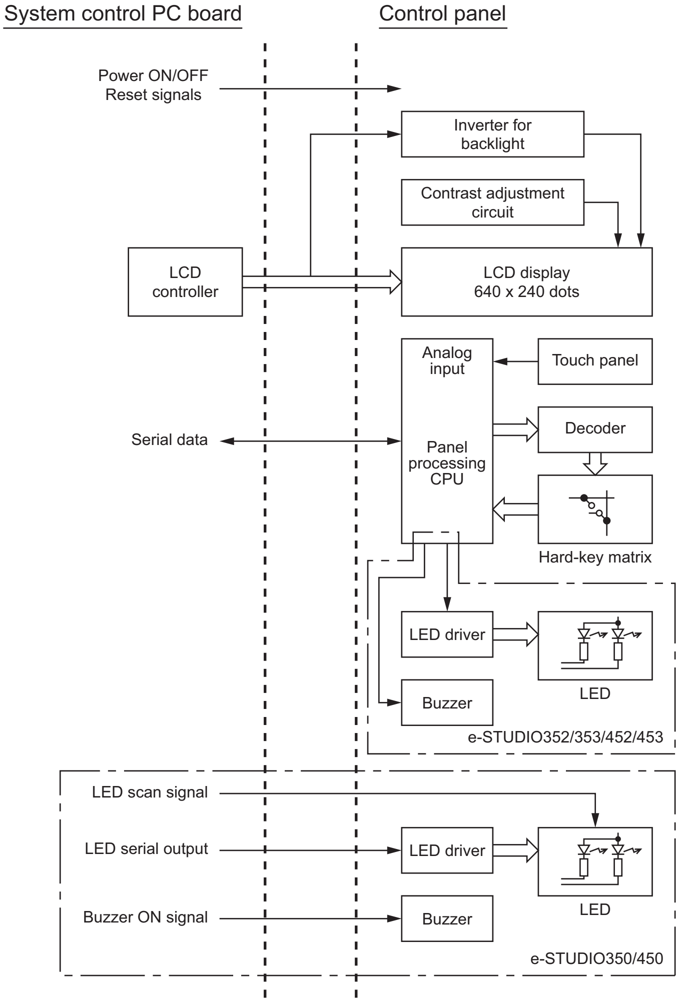

System control PC board
Control panel
Power ON/OFF
Reset signals
Inverter for backlight
Contrast adjustment circuit
LCD controller
LCD display
640 x 240 dots
Analog input
Touch panel
Serial data
Panel processing CPU
Decoder
Hard-key matrix
LED driver
LED
Buzzer
e-STUDIO352/353/452/453
LED scan signal
LED serial output
LED driver
LED
Buzzer ON signal
Buzzer
e-STUDIO350/450

Fig. 5-403

(4) Data Transmission

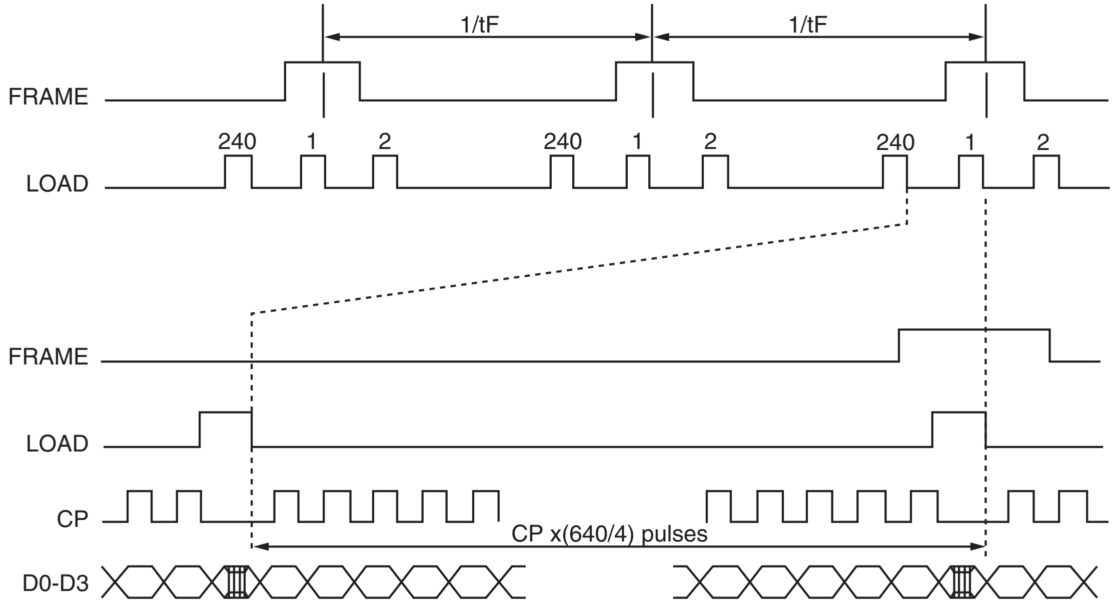

1/tF
1/tF
FRAME
240
1
2
LOAD
FRAME
LOAD
CP
CP x(640/4) pulses
D0-D3

Fig. 5-404

5.4.2 LED display circuit

(1) Method of LED display

ex) Displaying “COPY” .

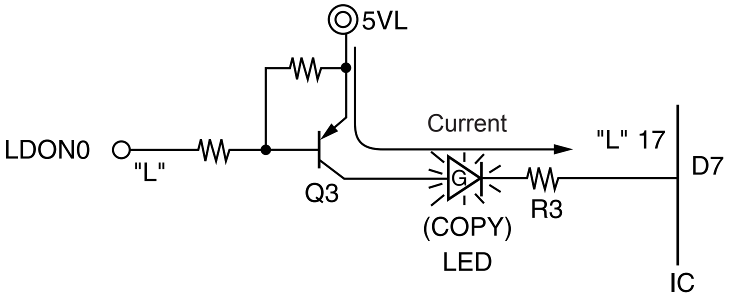

5VL
LDON0
"L"
Q3
Current
"L" 17
D7
G
R3
(COPY)
LED
IC

Fig. 5-405

Transistor is turned ON when the LDON 0 signal becomes “L” level.

Also, when IC pin changes to “L”, the current flows from 5VL via the transistor to the LED (“COPY”) to turn ON the LED (“COPY”).

Conditions to turn ON the LED

(a) The transistor (Q3) connected to the LED anode is ON.

(b) The output from the cathode side of the LED is “L” level.

The LED turns ON when the conditions (a) and (b) are met.

5.5 Disassembly and Replacement

Note: When taking off the control panel, check the position of the stopper; if the stopper is at the position “b”, remove the stopper or move it to the position “a”.

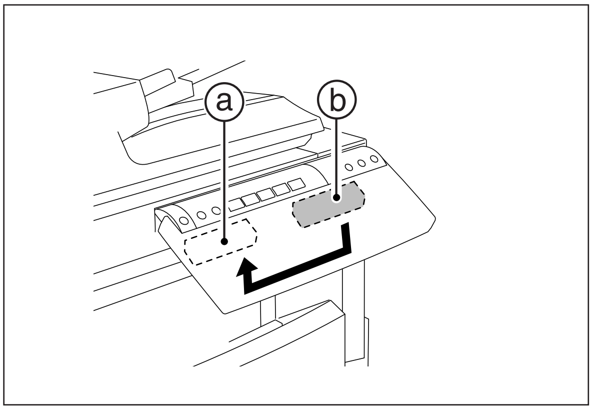


Fig. 5-501

[A] Stopper

(1) Slide the stopper and pull it out.

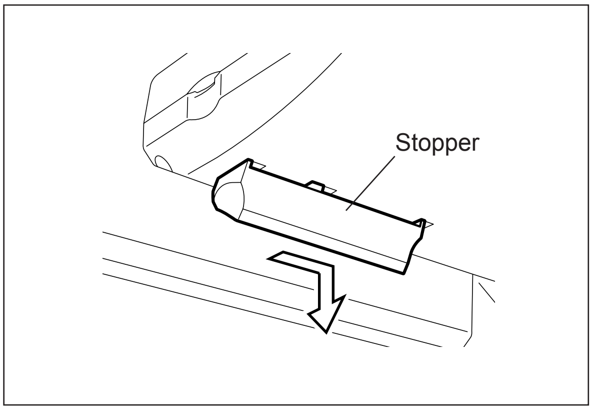


Fig. 5-502

[B] Control panel unit

(1) Take off the right upper cover and the front upper cover. (► Chapter 2.5.1 [I] [J])

(2) Disconnect 1 connector.

(3) Release the harness from 3 harness clamps.

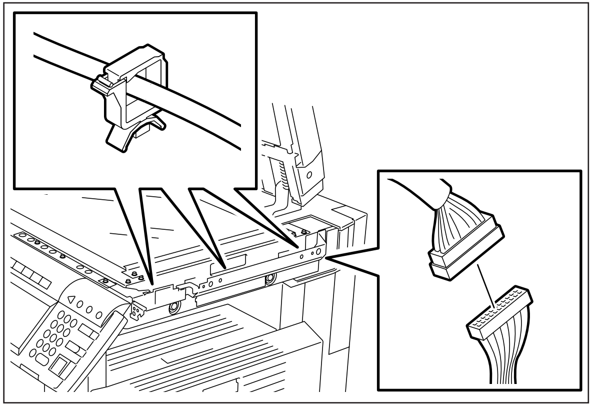


Fig. 5-503

(4) Lower the control panel and remove 4 screws.

(5) Take off the control panel unit while sliding it.

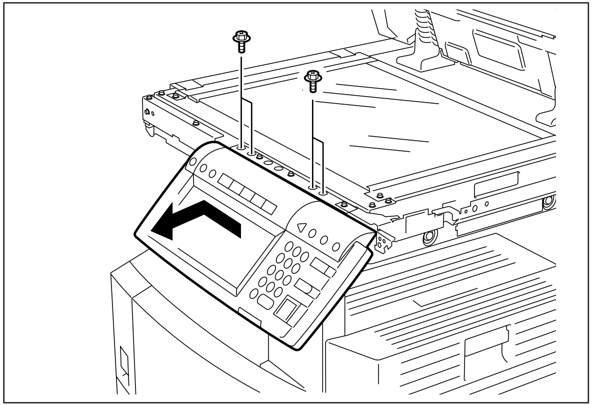


Fig. 5-504

(6) Remove 3 screws and take off the cover.

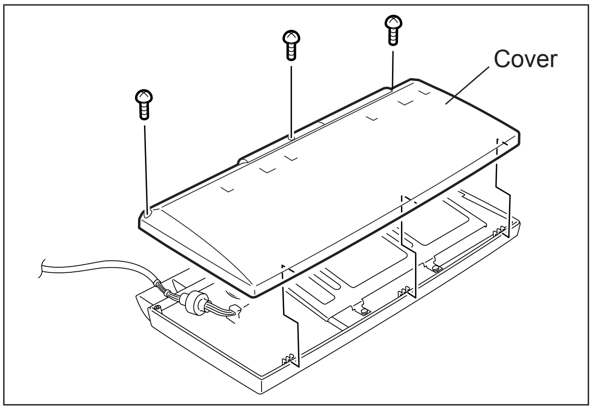


Fig. 5-505

(7) Remove 5 screws and take off the hinge bracket.

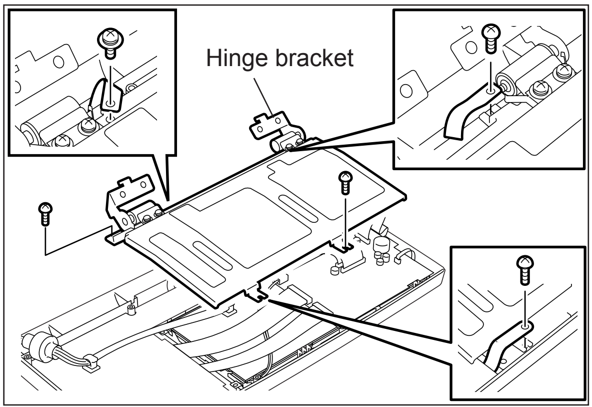


Fig. 5-506

(8) Disconnect 5 connectors.
(9) Release the harness from 2 harness clamps.
(10) Remove 1 screw and take off the DSP board.

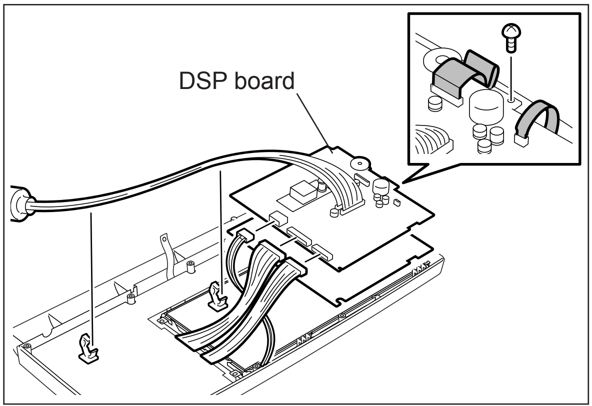


Fig. 5-507

(11) Remove 4 screws and take off the LCD.

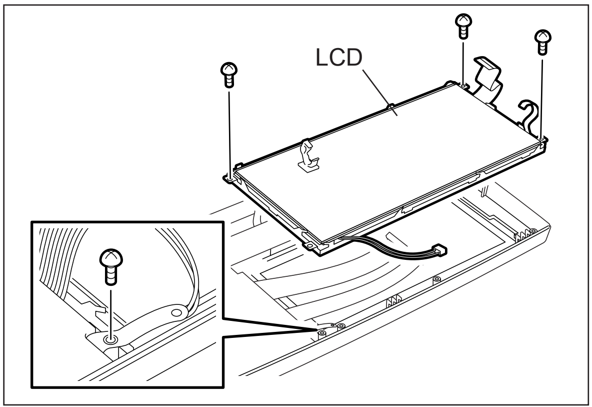


Fig. 5-508

(12) Remove 16 screws and take off the KEY board.

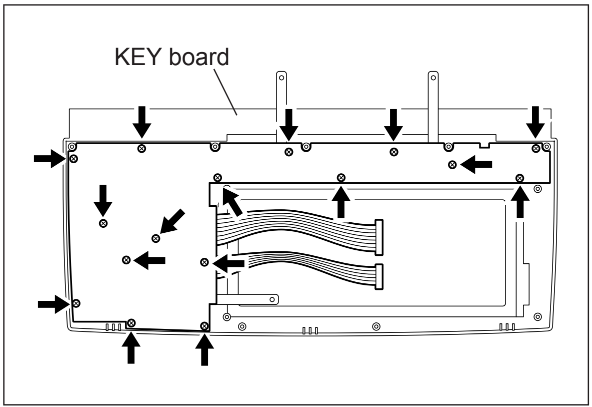


Fig. 5-509

6. SCANNER

6.1 Function

In the scanning section of this equipment, the surface of an original is irradiated with a direct light and the reflected light is led through mirrors, a lens and a slit to CCD where optical-to-electrical conversion is performed, converting the optical image data into an electrical (analog) signal. This analog signal is changed to a digital signal, which then undertakes various corrective processes necessary for image formation. After that, arithmetic operation is performed on the digital signal, which is then transmitted to the data writing section.

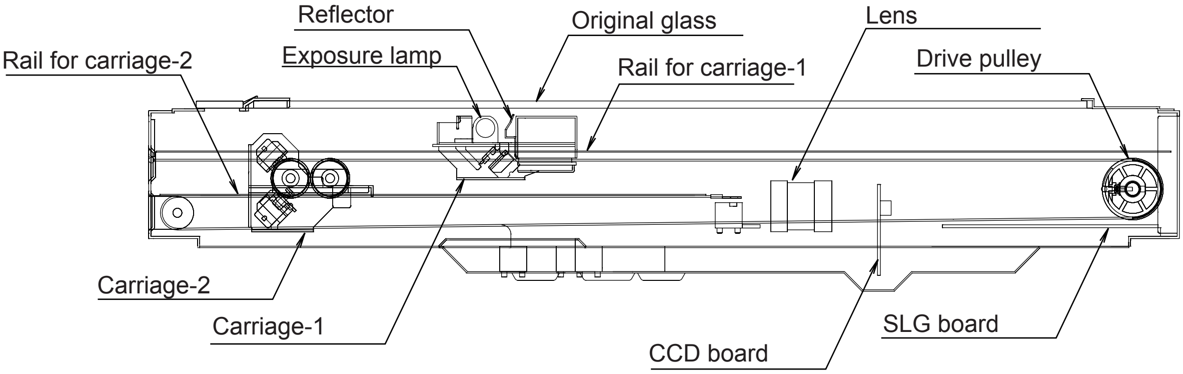

Reflector
Original glass
Lens
Rail for carriage-2
Exposure lamp
Rail for carriage-1
Drive pulley
Carriage-2
Carriage-1
CCD board
SLG board

Fig. 6-101

6.2 Construction

The following shows the construction and purpose of the scanning system:

(1) Original glass

This is a glass on which original is placed. The light from the exposure lamp is irradiated to the original through this glass.

(2) Carriage-1

Carriage-1 consists of the exposure lamp, lamp inverters, reflector, mirror-1, etc. It is driven by the scan motor and scans an original on the glass.

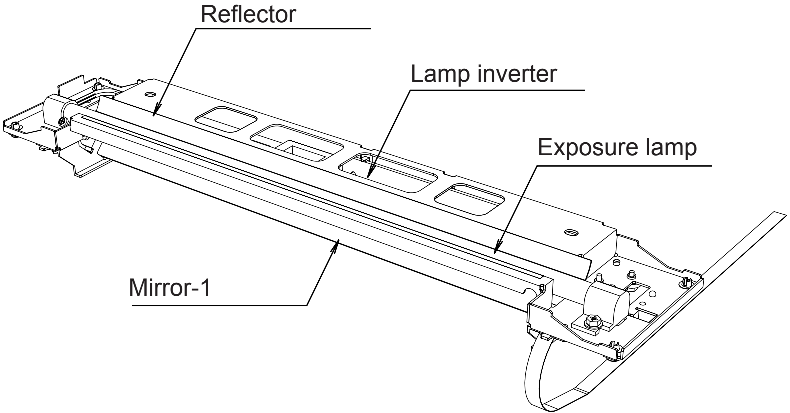

Reflector
Lamp inverter
Exposure lamp
Mirror-1

Fig. 6-201

a. Exposure lamp

This lamp is the light source to irradiate the original on the glass. (One 16W xenon lamp)

b. Lamp inverter

Controls lighting of the xenon lamp.

c. Reflector

This is a plate to efficiently direct the light from the exposure lamp to the surface of the original on the glass.

d. Mirror-1

This mirror directs the light reflected from the original to the mirror-2 described later.

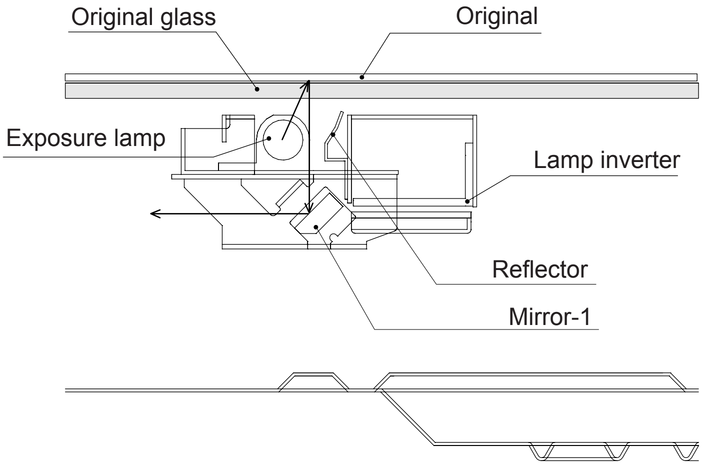

Original glass
Original
Exposure lamp
Lamp inverter
Reflector
Mirror-1

Fig. 6-202

(3) Carriage-2

Carriage-2 mainly consists of the mirror-2, mirror-3, etc. and directs the reflected light from the mirror-1 through the mirrors-2 and -3 to the lens.

This carriage is driven by the same scan motor as that for the carriage-1 at half the scanning speed of the carriage-1 (The scanning distance is also half that of the carriage-1).

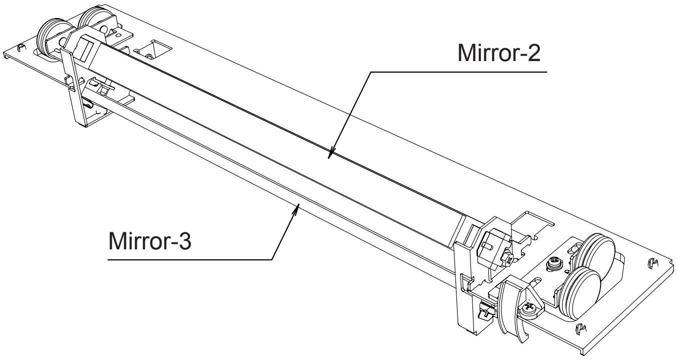


Fig. 6-203

(4) Lens unit

The light reflected from the mirror-3 is led to the CCD placed at the focal point of the lens which is fixed in a position.

(5) CCD driving board (CCD board)

This is a board to convert the optical image signal which has been converted by the CCD into an analog signal.

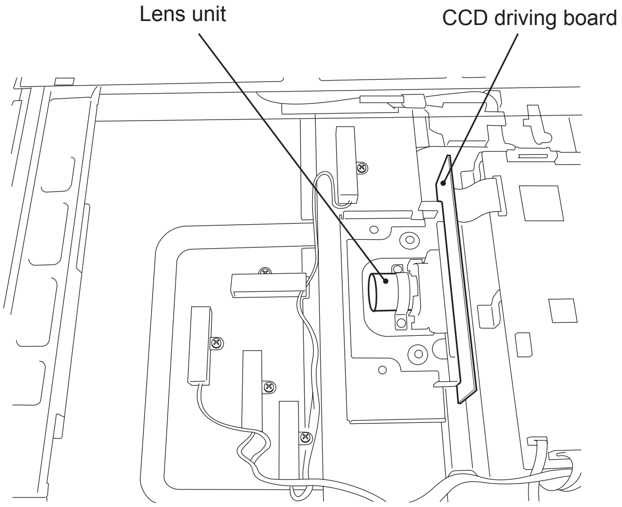


Fig. 6-204

(6) Automatic original detection sensor

The size of an original placed on the glass is instantly detected using the automatic original detection sensors (APS sensor) fixed on the base frame without moving the carriage-1.

6.3 Description of Operation

6.3.1 Scan motor

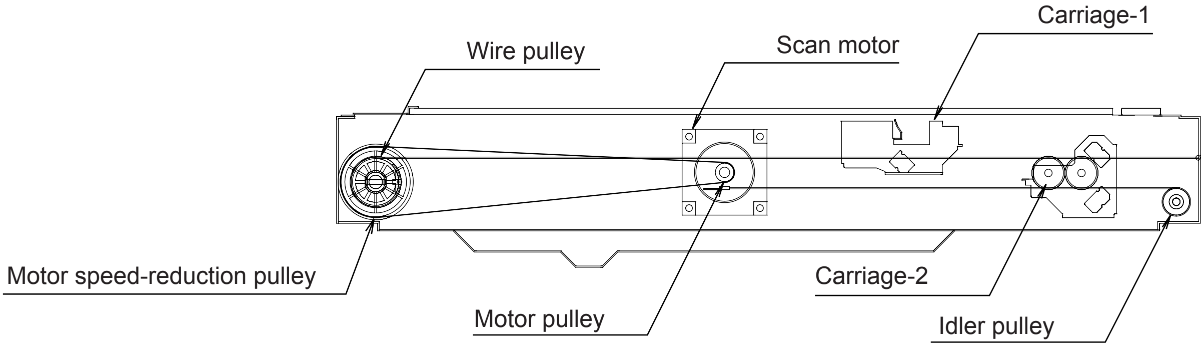

Wire pulley
Scan motor
Carriage-1
Motor speed-reduction pulley
Carriage-2
Motor pulley
Idler pulley

Fig. 6-301

(a) Scanning of an original placed on the original glass

This motor drives the carriages-1 and -2 through the timing belt and carriage wire. First, the scan motor drives the carriages-1 and -2 to their respective home position. The home position is detected when the carriage-1 passes the home position sensor. When the [START] button is pressed, the both carriages start to move and scan the original on the glass.

(b) Scanning of an original placed on the RADF

The carriage-1 stays at the shading position during shading correction, and at the scanning position during scanning operation.

6.3.2 Scanning drive circuit

The scan motor is a 2-phase stepping motor and driven by the driver IC (IC16).

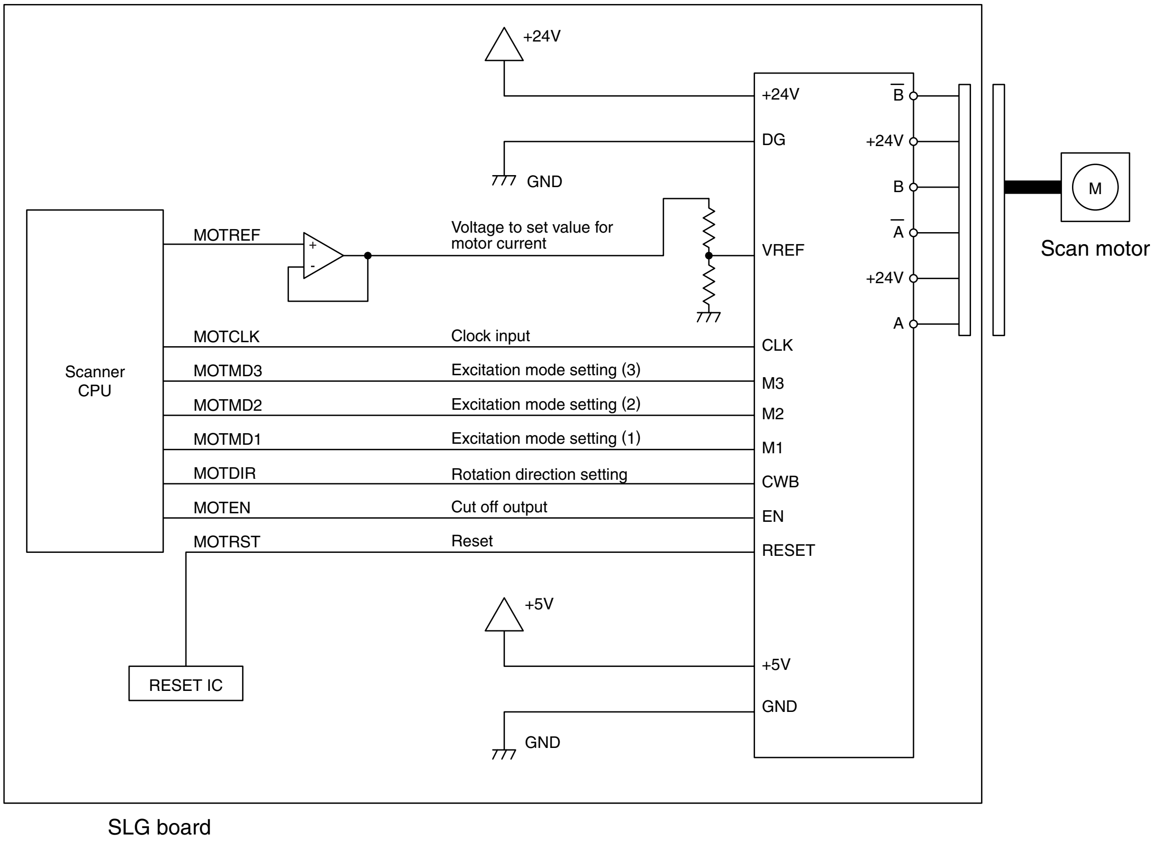

+24V
+24V
DG
GND
$\overline{B}$
+24V
B
$\overline{A}$
+24V
A
M
Scan motor
Scanner CPU
MOTREF
Voltage to set value for motor current
VREF
MOTCLK
Clock input
CLK
MOTMD3
Excitation mode setting (3)
M3
MOTMD2
Excitation mode setting (2)
M2
MOTMD1
Excitation mode setting (1)
M1
MOTDIR
Rotation direction setting
CWB
MOTEN
Cut off output
EN
MOTRST
Reset
RESET
+5V
+5V
RESET IC
GND
GND
SLG board

Fig. 6-302

Input/output signals

Clock input	MOTCLK	Input	Motor is rotated by setting number of pulse. * Internal circuit of the motor driver works when the first pulse be-comes ON and the last pulse becomes OFF.
Set the direction of motor rotation	MOTDIR	Input	The direction of the motor rotation is determined by setting level of signal. “L”….Clockwise direction (as seen from the output shaft) “H”…Counterclockwise direction (as seen from the output shaft) Note: When the MOTMD3 is “L”, do not change the rotation direction within 6.25μs before the first pulse of the MOTCLK becomes ON and after the last pulse becomes OFF.
Cut OFF the drive output	MOTEN	Input	Excitation drive is forcibly turned ON/OFF. “H”…Normal operation (Excited) “L”.....Excitation drive is forcibly shut OFF (Not excited)
Voltage to set value for the motor current	MOTREF	Input	Motor wire current value is set in the range of 0 to 1.7 (A)/phase by applying the analog voltage 0 to 5 (V).
Set the exicitation mode (1) to (3)	MOTMD1 to 3	Input	Set the excitation mode. Note:Do not change the setting within 5μs after the first pulse of the MOTCLK becomes ON and the last pulse becomes OFF.
Reset	MOTRST	Input	Reset for the whole system Internal circuit of the driver is initialized by setting the motor to “L” level (pulse interval: 10μs or more). The motor drive circuit is automatically reset when the power is turned ON.

6.3.3 Initialization at power-ON

The carriage moves to its home position and performs the peak detection.

Then it moves to the carriage waiting position and waits.

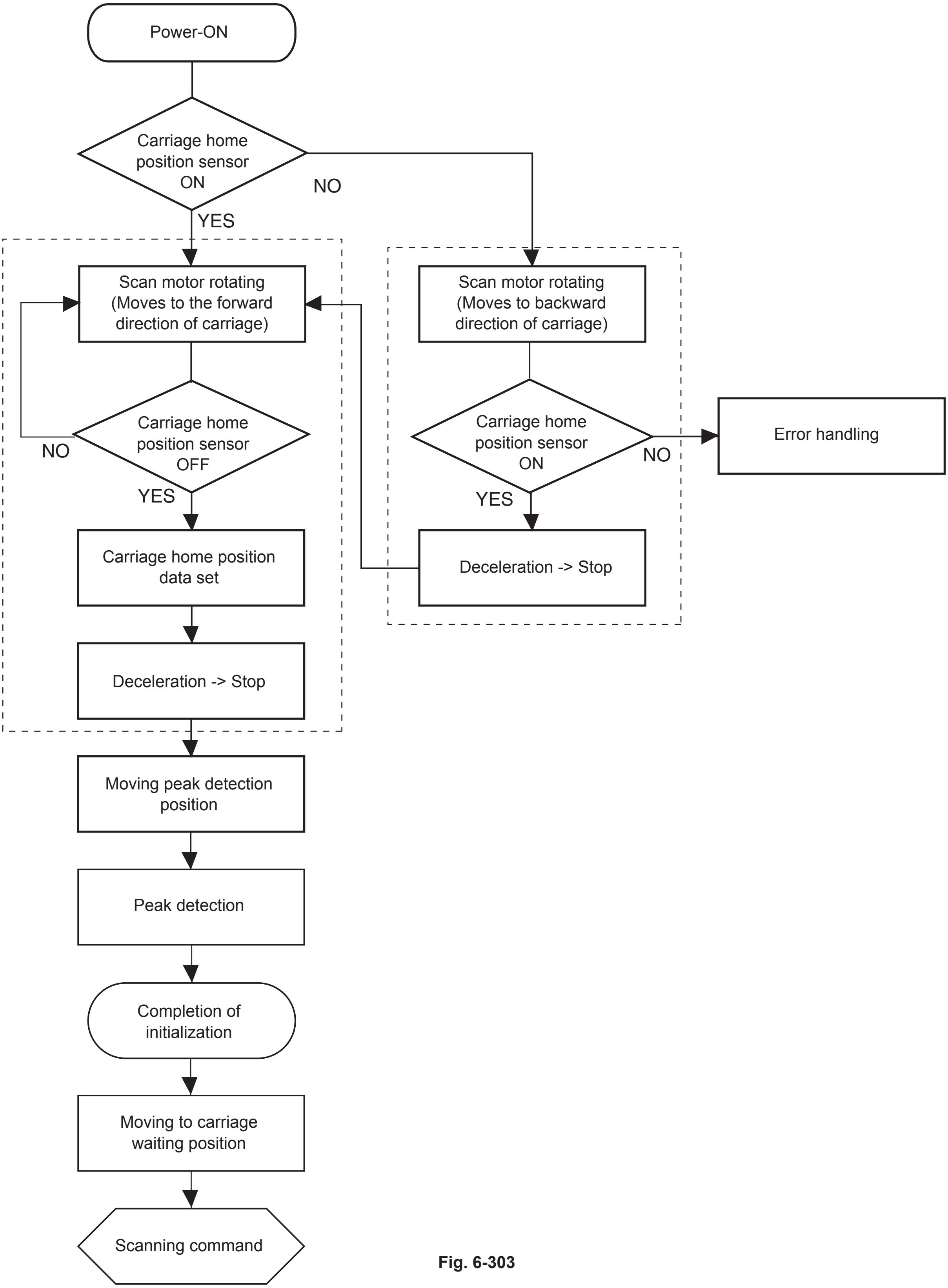

Power-ON
Carriage home position sensor ON
NO
YES
Scan motor rotating (Moves to the forward direction of carriage)
Carriage home position sensor OFF
NO
YES
Carriage home position data set
Deceleration -> Stop
Scan motor rotating (Moves to backward direction of carriage)
Carriage home position sensor ON
NO
YES
Error handling
Deceleration -> Stop
Moving peak detection position
Peak detection
Completion of initialization
Moving to carriage waiting position
Scanning command

Fig. 6-303

6.4 Control of Exposure Lamp

6.4.1 General description

Control circuit for the exposure lamp consists of the following three blocks:

(1) Lighting device for the xenon lamp (Inverter)

Turns ON/OFF the exposure lamp.

(2) CCD circuit

This circuit converts the reflected light amount from the original surface and the shading correction plate to electrical signals. The exposure amount is controlled in two ways:

(a) White reference formation - reads the reflected light amount from the white shading correction plate

(b) Black reference formation - reads the light amount at the regulation position with the exposure lamp lights OFF

(3) Image processing circuit

A series of image processes such as a gamma correction and a shading correction are applied on the output signal from the CCD. The signal is then digitized and output from this circuit.

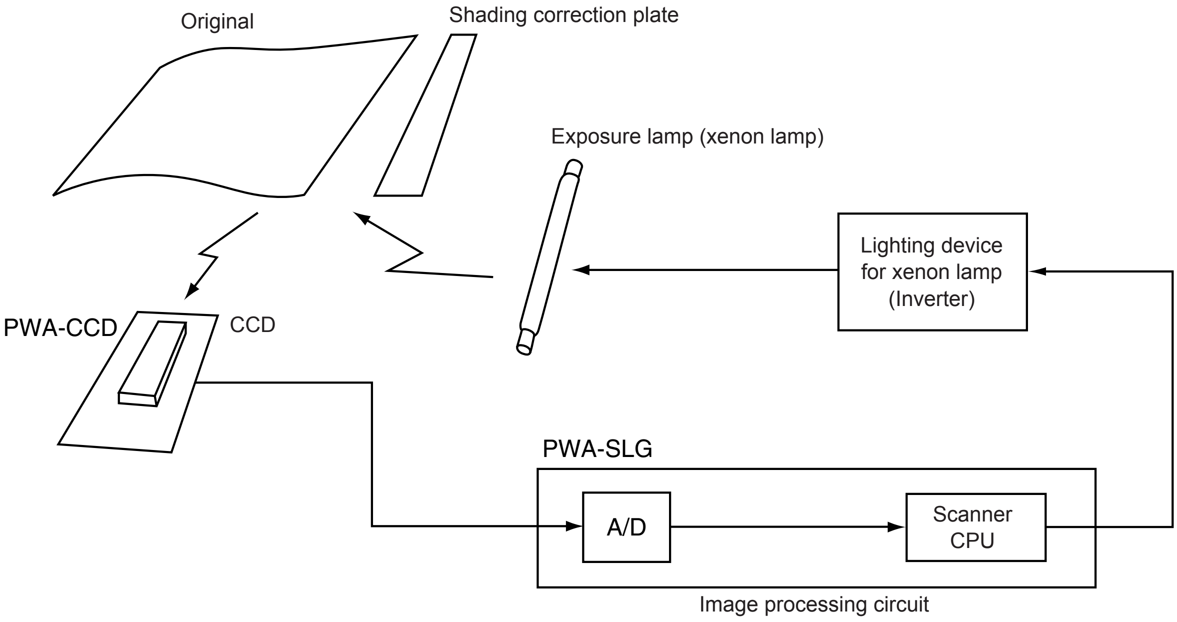

Original
Shading correction plate
Exposure lamp (xenon lamp)
Lighting device for xenon lamp (Inverter)
PWA-CCD
CCD
PWA-SLG
A/D
Scanner CPU
Image processing circuit

Fig. 6-401

6.4.2 Exposure lamp

External electrode type xenon fluorescent lamp is used as an exposure lamp in this equipment.

(1) Structure

Fluorescer is applied on the inside surface of the lamp pipe (except a part to be an opening) which is filled with the xenon gas.

A pair of the external electrodes covered by the film with the adhesive agent is attached over the pipe.

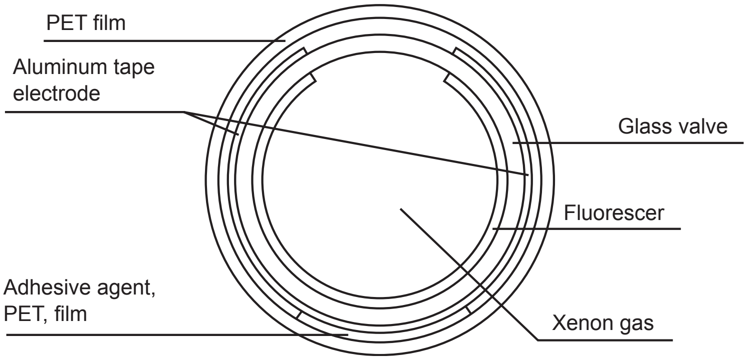
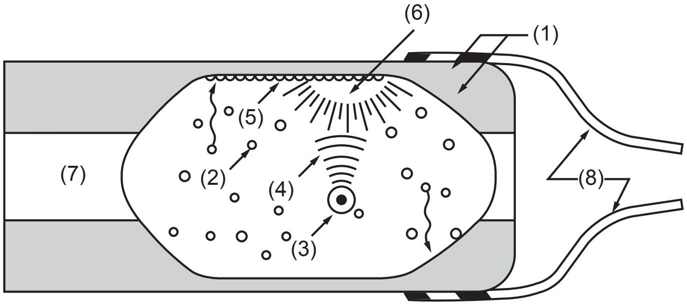


Fig. 6-402

(2) Behavior inside the lamp

The electron inside the pipe is led to the electric field by applying voltage to the pair of the external electrodes, and discharge is started. Electrons then flow and clash with the xenon atom inside the pipe to excite them, and generate the ultraviolet ray. This ultraviolet ray converts the fluorescer into the visible light.



(1)Electrode (2)Electron (3)Xenon atom (4)Ultraviolet ray (5)Fluorescer
(6)Visible light (irradiated from the opening to outside the pipe)
(7)Opening (8)Harness

Fig. 6-403

6.4.3 Control circuit for the exposure lamp

SLG board

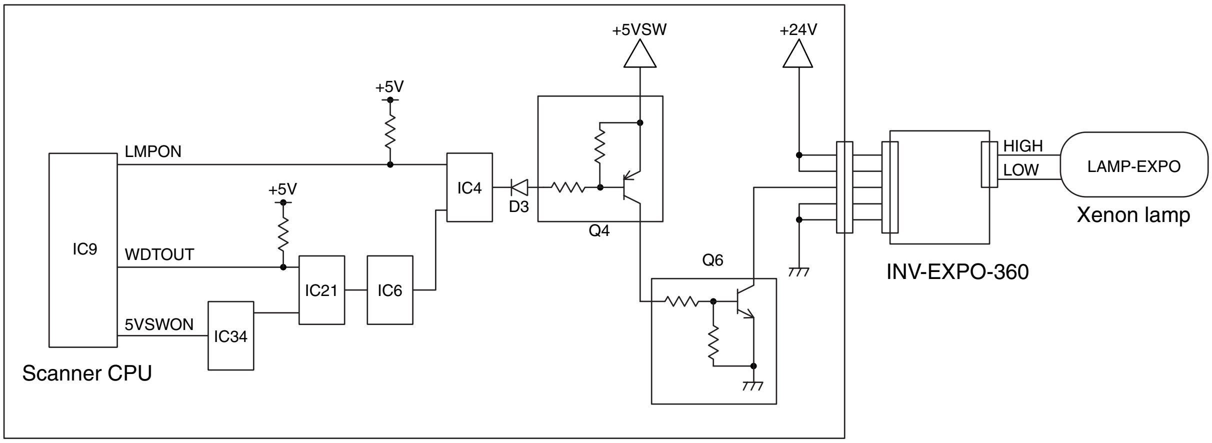

+5VSW
+24V
+5V
LMPON
IC9
+5V
WDTOUT
IC4
D3
Q4
IC21
IC6
5VSWON
IC34
Scanner CPU
Q6
HIGH
LOW
LAMP-EXPO
Xenon lamp
INV-EXPO-360

Fig. 6-404

Working conditions

LMPON	L	-	-	-	Exposure lamp ON signal	Lamp turns ON at "L"
5VSW ON	L	H	-	-	5V SW ON signal	Controls 5VSW by CPU. Normally "L"
WDTOUT	H	-	L	-	Watchdog timer signal	"L" is output when CPU is out of control
Xenon lamp	ON	OFF				

6.5 General Description of CCD Control

6.5.1 Opto-electronic conversion

A CCD (charge-coupled device) is used to produce electrical signal corresponding to the reflected light amount from the original. CCD is a one-chip opto-electronic conversion device, comprised of several thousand light-receiving elements arranged in a line, each one of them is a few micron square.
This equipment is equipped with a CCD which has 7,400 light-receiving elements.
Each element of the light-receiving section consists of semiconductive layers P and N. When the light irradiates the element, light energy produces a (-) charge in the layer P; the amount of the charge produced is proportional to the energy and irradiating time. The charges produced in the light-receiving section are then sent to the transfer section where they are shifted by transfer clock from left to right as shown in the figure below, and are finally output from the CCD. At this time, to increase the transfer speed of the CCD, image signals in the even-number and odd-number elements are separated and output in parallel via two channels.

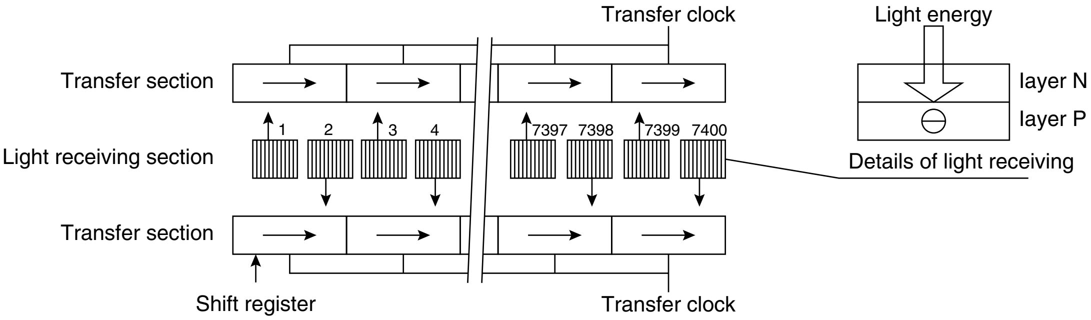


Fig. 6-501

6.5.2 Shading correction

Signal voltages read by the CCD have the following characteristics:

(1) Light source has a variation in its light distribution.

(2) Since the light beam reflected from the original is converged using a lens, the light path is the shortest at the center of the CCD and the longest at ends. This causes difference in the amount of light reaching the CCD (i.e. the light amount is maximum at the CCD center, gradually decreases toward ends).

(3) Each of the 7,400 elements varies in opto-electronic conversion efficiency.

These variation need to be corrected and this correction is referred to as shading correction. Shading correction is performed by applying normalization process using the following formula on the black and white data obtained in advance to correct lighting variance and element variation of the image data.

$$I = k \times \frac{(S - K)}{(W - K)}$$

k : Coefficient
S : Image data before correction
K : Black data (stored in “black” memory)
W : White data (stored in “white” memory)

6.6 Automatic Original Size Detection Circuit

This circuit detects the size of original (standard sizes only) using the reflection type photosensors arranged on the base frame of the scanner unit.

6.6.1 Principle of original size detection

Reflection type photosensors are placed on the base frame of the scanner unit as shown in the Fig. 6-601. Each sensor consists of an infrared light emitting diode (LED) on the light emitting side, and a phototransistor on the light receiving side.

When there is an original on the original glass, light beams from the LEDs are reflected by the original and led to the phototransistors. This means that the presence of the original is detected by the presence of reflection.

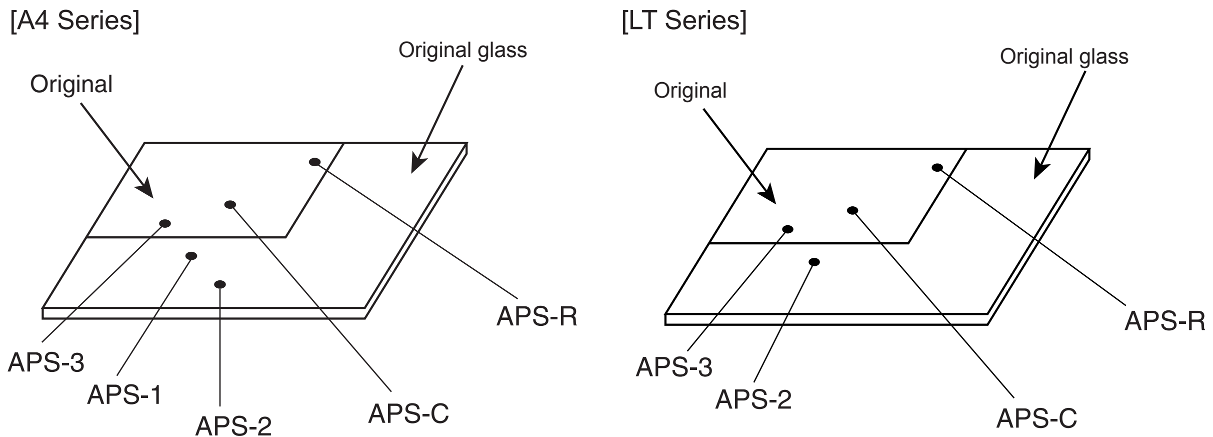

[A4 Series]
Original
Original glass
APS-R
APS-3
APS-1
APS-2
APS-C
[LT Series]
Original
Original glass
APS-R
APS-3
APS-2
APS-C

Fig. 6-601

6.6.2 Process of detection of original size

(1) When the equipment is in the original size detection mode, carriage-1 is set at its home position.

(2) When the platen cover is opened, the sensors receive the light reflected from the original and if one of the matrix conditions shown in (4) for original sizes are met, the size of the original is instantly detected.

(3) The output signal from each sensor is input to CPU on the SLG board to determine the size of the original.

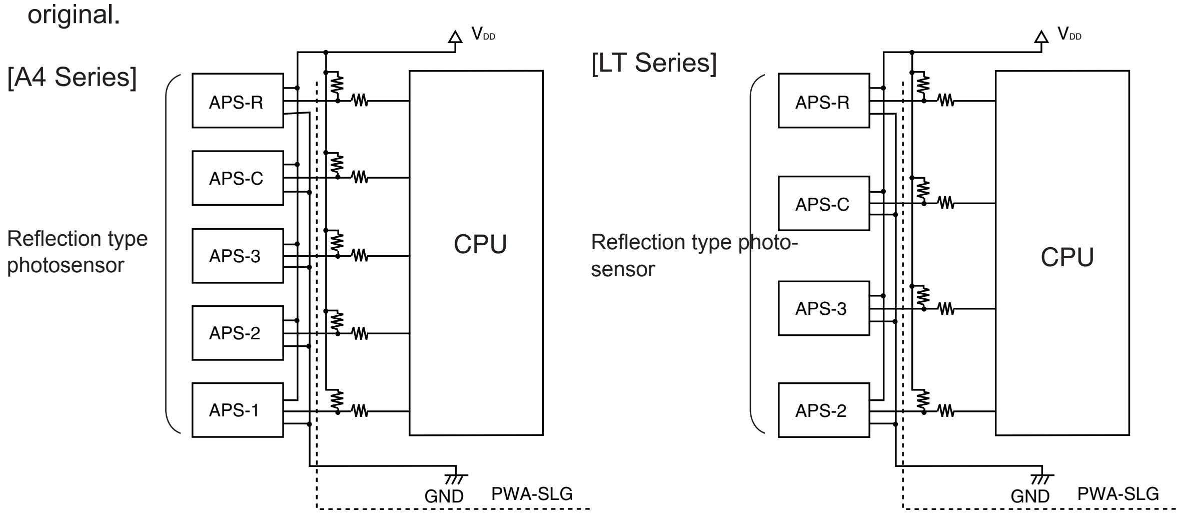
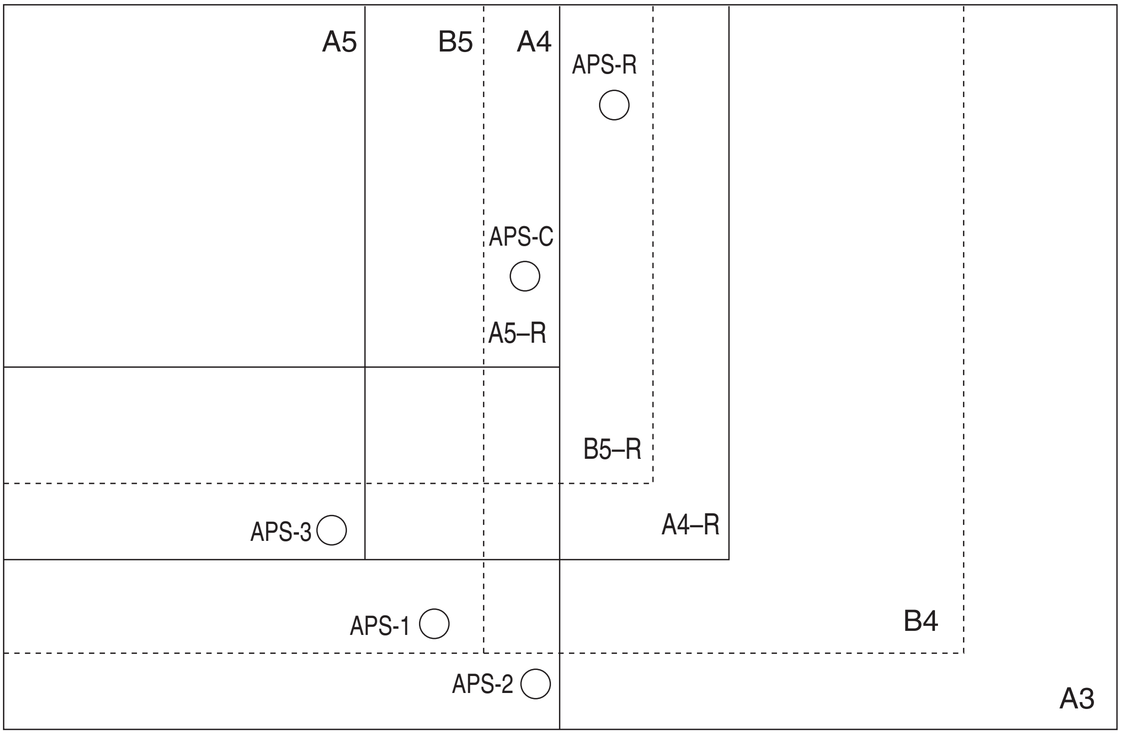

[A4 Series]
VDD
APS-R
APS-C
APS-3
APS-2
APS-1
Reflection type photosensor
CPU
GND
PWA-SLG
[LT Series]
VDD
APS-R
APS-C
APS-3
APS-2
Reflection type photo-sensor
CPU
GND
PWA-SLG

Fig. 6-602 Original size detection circuit

[A4 Series]


A5
B5
A4
APS-R
APS-C
A5–R
B5–R
APS-3
A4–R
APS-1
B4
APS-2
A3

[LT Series]

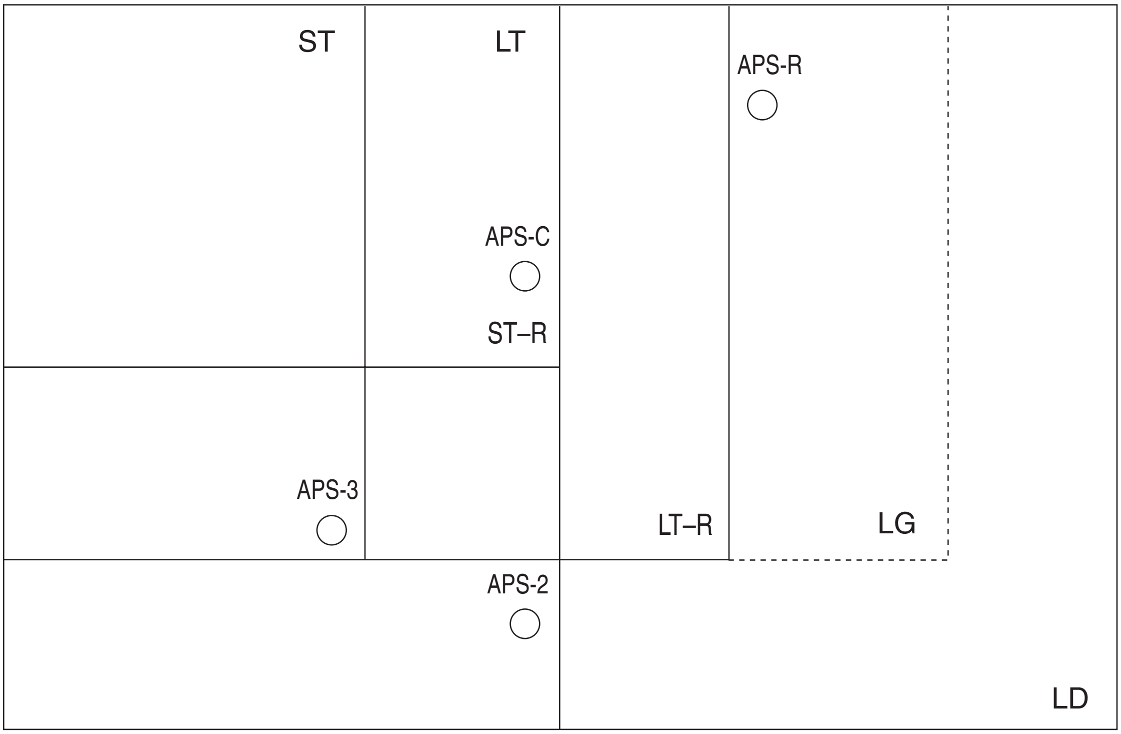

ST
LT
APS-R
APS-C
ST–R
APS-3
LT–R
LG
APS-2
LD

Fig. 6-603 Sensor detection points

(4) Original size is determined by the combination of the signals output from each detection point. Combination charts for size determination of A4 series and LT series are as follows.

[A4 Series]

Size judgement	APS-C	APS-R	APS-1	APS-2	APS-3
A3	0	0	0	0	0
A4	0	1	0	0	0
B4	0	0	0	1	0
B5	1	1	0	1	0
A4-R	0	0	1	1	0
A5	1	1	1	1	0
B5-R	0	0	1	1	1
A5-R	0	1	1	1	1

[LT Series]

Size judgement	APS-C	APS-R	APS-2	APS-3
LD	0	0	0	0
LT	0	1	0	0
LG	0	0	1	0
LT-R	0	1	1	0
ST	1	1	1	0
ST-R	0	1	1	1

Code	Output signal	Original
1	H	Not available
0	L	Available

* When the platen sensor is OFF,

- The followings are determined by output signals from the APS sensors.
  Size (The combination of the signals satisfy any in the above chart)
  :Size is displayed on the control panel and a specific paper or reproduction ratio is selected.
  Size retention (The combination of the signals do not satisfy the above chart)
  :The latest original size recognized (or no original state) until new paper size is recognized.
  No original (Output from all the sensors are “H”.)
  :Reproduction ratio and paper are not selected.
- Size change is always observed and detected.
- The carriage-1 stays at the standby position even if the reproduction ratio changes corresponding to the change of the original size.

* When the platen sensor is ON,
The latest original size (or no original state) recognized right before the platen sensor is turned ON is retained regardless of the status the APS sensor output signals.

About reflection type photosensor

The reflection type photosensor is comprised of an infrared light emitting diode and a phototransistor. It uses pulse modulation to detect an original.

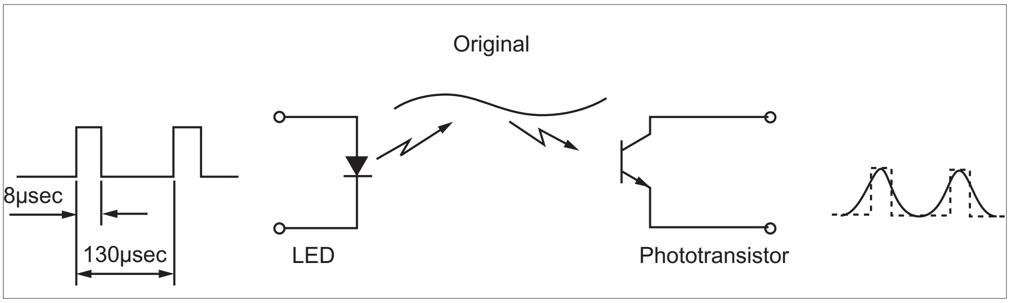


Fig. 6-604

The light emitting diode is driven by a pulse having a 130 μsec cycle and an 8 μsec ON time. When the phototransistor receives the same signal as this pulse, it is determined that there is an original. The pulse modulation is performed inside the reflection type phototransistor.

6.7 Disassembly and Replacement

[A] Original glass

(1) Take off the right upper cover (▶ Chapter 2.5.1 [F]).

(2) Remove 2 screws and take off the fixing bracket.

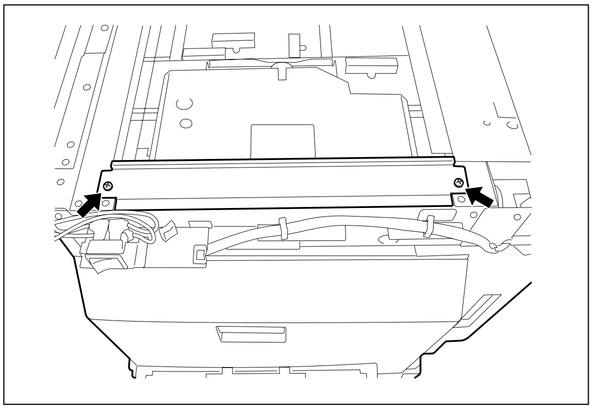


Fig. 6-701

(3) Take off the original glass.

Note:

When installing, fit 2 small protrusions of the original glass in the groove of the equipment and fix the original glass with the fixing bracket by pushing it to the left rear direction.

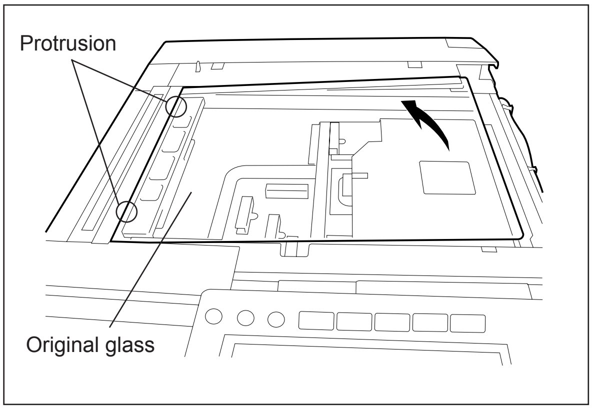


Fig. 6-702

[B] Lens cover

(1) Take off the original glass (▶ Chapter 6.7 [A]).

(2) Remove 6 screws and take off the lens cover.

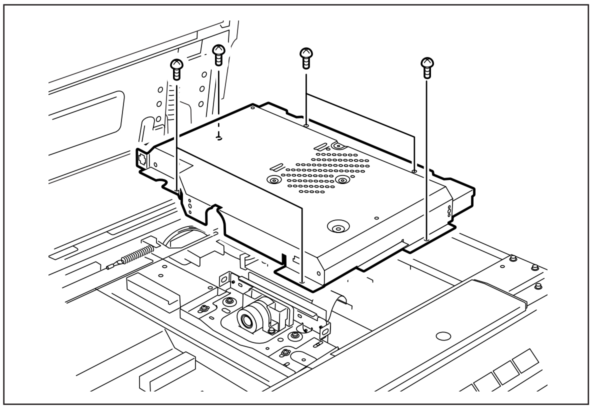


Fig. 6-703

[C] Automatic original detection sensor (APS sensor)

(C-1) A4 series

(1) Take off the lens cover (▶ Chapter 6.7 [B]).

(2) Disconnect 1 connector from the SLG board.

(3) Release the harnesses from 6 harness clamps.

(4) Remove 1 screw each and take off the APS sensors (5 pcs.).

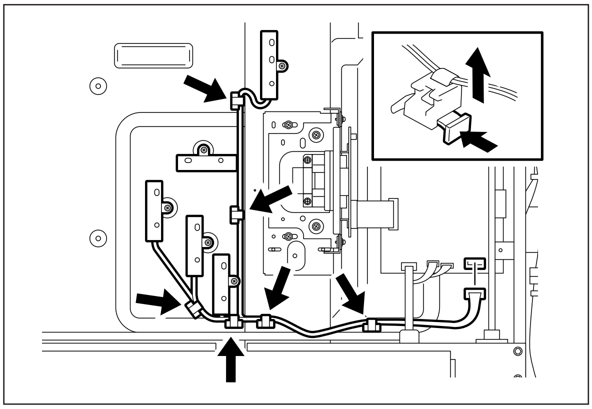


Fig. 6-704A

(C-2) LT series

(1) Take off the lens cover (▶ Chapter 6.7 [B]).

(2) Disconnect 1 connector from the SLG board.

(3) Release the harnesses from 6 harness clamps.

(4) Remove 1 screw each and take off the APS sensors (4 pcs.).

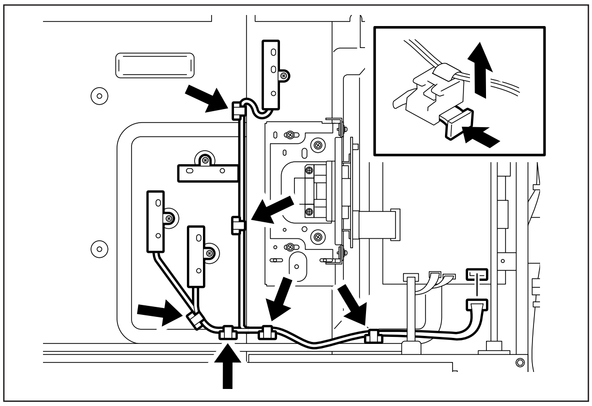


Fig. 6-704L

[D] Exposure lamp

(1) Take off the original glass (▶ Chapter 6.7 [A]).

(2) Take off the front upper cover (▶ Chapter 2.5.1 [E]).

(3) Move the carriage-1 to the center position where the side of the frame is cut out.

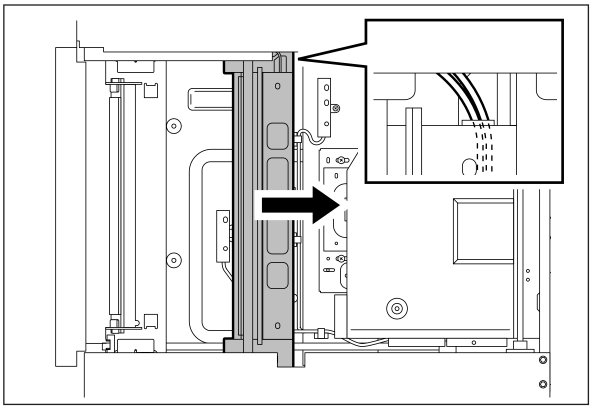


Fig. 6-705

(4) Disconnect 1 connector from the INV board.

(5) Release the harness from 1 harness clamp and pull out the harness from the frame of the carriage.

Note:

When disconnecting the connector, make sure not to overload the carriage frame.

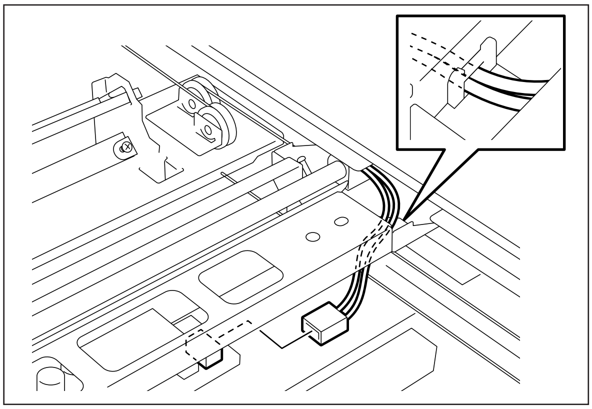


Fig. 6-706

(6) Move the carriage-1 to the position where the exposure lamp is seen through the cut-out of the frame.

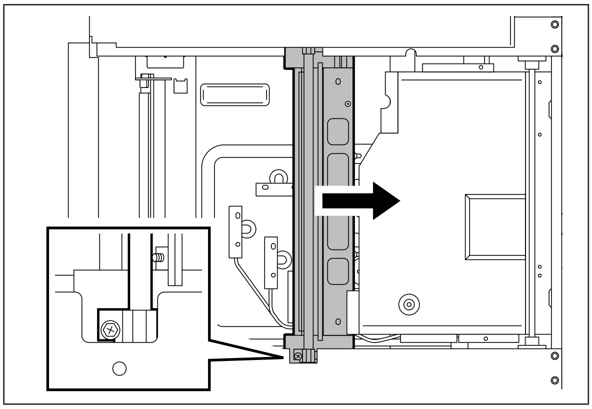


Fig. 6-707

(7) Remove 1 screw. Lift up the exposure lamp and take it off by pulling out toward you.

Note:

Make sure to hold only the black molded part of the exposure lamp. Do not touch any other part than this black molded part.

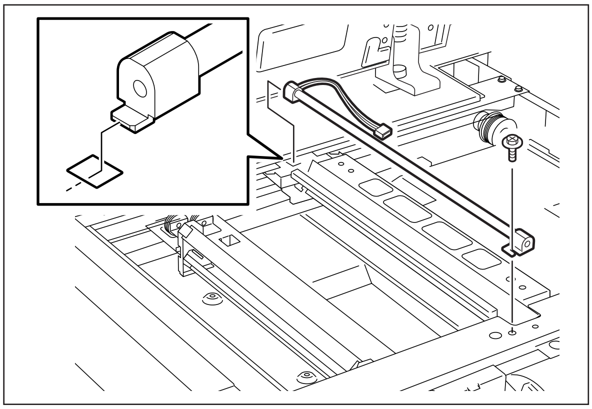


Fig. 6-708

[E] Lens unit

(1) Take off the lens cover (▶ Chapter 6.7 [B]).

(2) Disconnect 1 connector from the SLG board.

(3) Remove 2 screws and take off the lens unit.

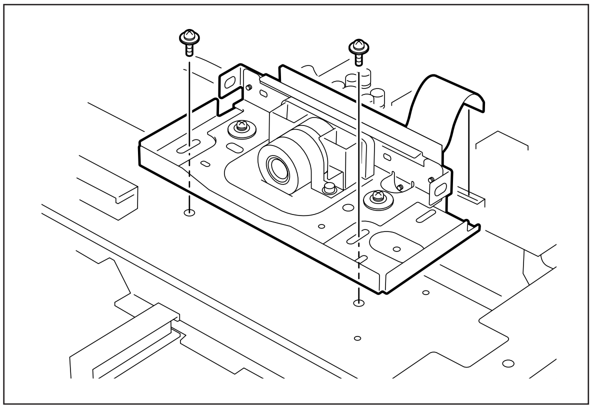


Fig. 6-709

Notes:

1. When installing, fix the lens unit with the screws while pushing the unit to the rear side.
2. Refer to “3.7.2 Lens Unit” in the Service Handbook for the adjustment method.
3. Never attempt to loosen the screws (8 pcs.) of the lens unit denoted with arrows.

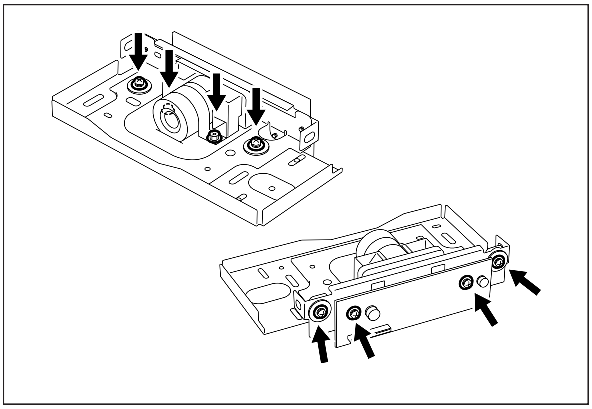


Fig. 6-710

4. Handle the unit with extra care. Do not touch the adjusted area or lens. (Hold the unit as shown in the figure at right.)

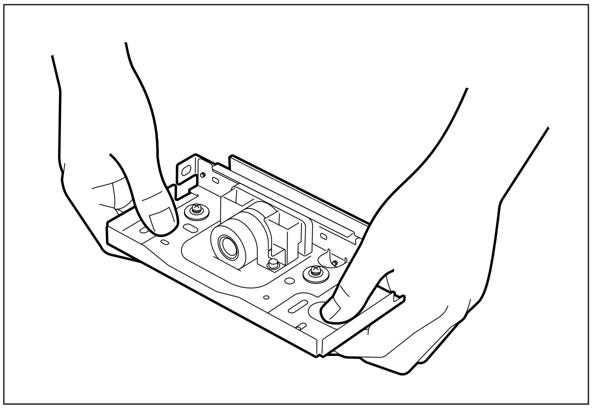


Fig. 6-711

[F] Scan motor

(1) Take off the rear cover and upper rear cover (▶ Chapter 2.5.1 [C][G]).

(2) Disconnect the connector of the scan motor and remove 1 spring.

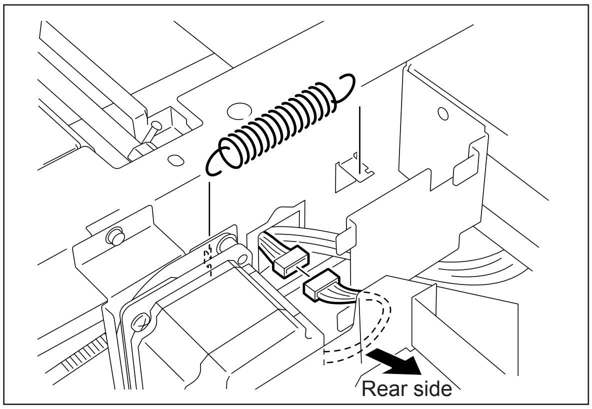


Fig. 6-712

(3) Remove 3 screws and take off the scan motor.

Note:

When installing, use a stepped screw to fix the left rear point.

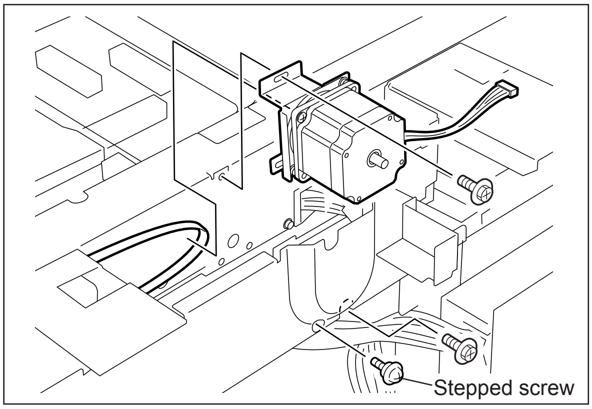


Fig. 6-713

[G] Carriage-1

(1) Take off the original glass (▶ Chapter 6.7 [A]).

(2) Take off the upper rear cover and front upper cover (▶ Chapter 2.5.1 [G][E]).

(3) Move the carriage-1 to the position shown in the figure at right, and match the positions of each hole and screw.

(4) Remove 2 screws. Then pull down each bracket fixing the wire from the hole of the frame on both ends of carriage-1.

(5) Disconnect 1 connector from the SLG board. Remove 2 seals and release the cable.

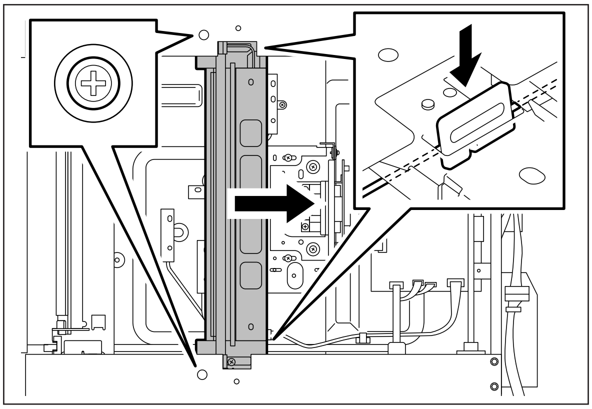


Fig. 6-714

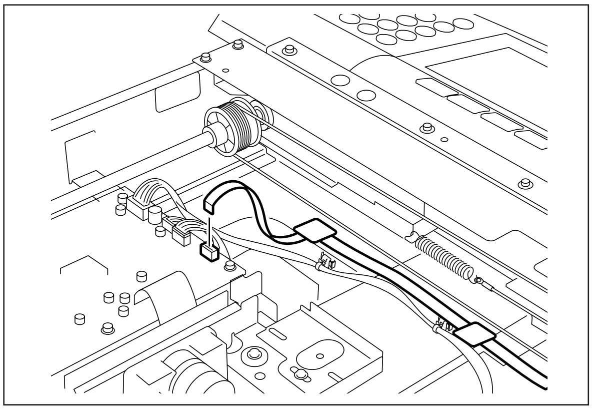


Fig. 6-715

Note:

Make sure to hold only the black molded part of the exposure lamp. Do not touch any other part than this black molded part.

1. Using alcohol, clean the area where the seal is to be attached..
2. Align the black line on the lamp harness with the position as shown in the figure, and fix it with a seal.

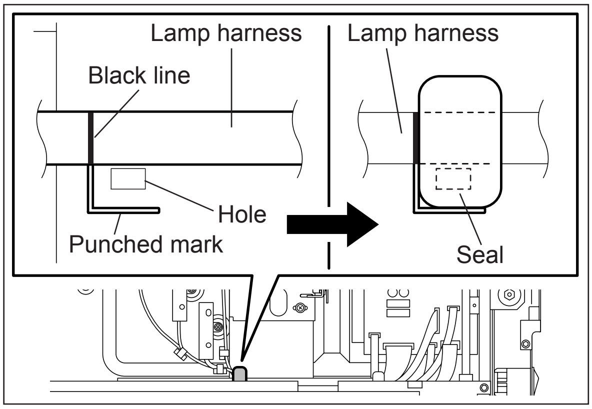


Fig. 6-716

3. Align the bent portion of the lamp harness with the position as shown in the figure, and fix it with a seal.
4. After the installation, move carriage-1 towards the left and confirm that there is no abnormality in the lamp harness, such as twisting.

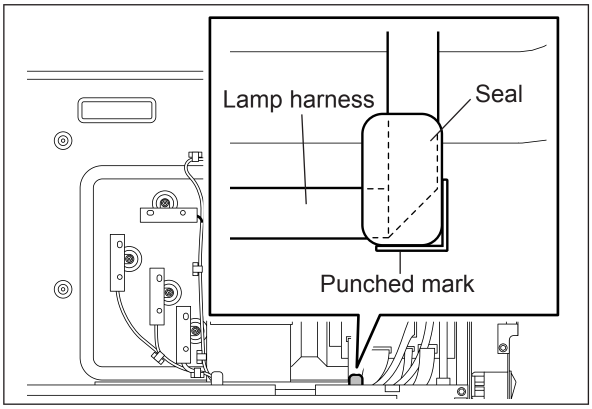


Fig. 6-717

(6) Rotate the carriage-1 in the direction shown in the figure at right, not to touch the mirror. Then take off the carriage-1.

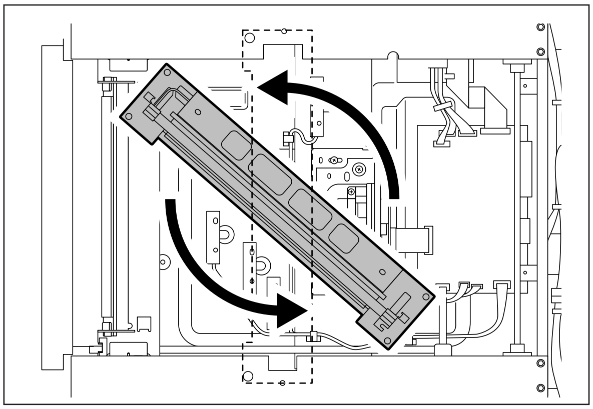


Fig. 6-718

Note:

When installing the carriage-1, fix the bracket temporarily at the position (A). Then move it to the direction (B) slowly, push it to the end of frame and fix at this position with the screws. (Refer to 3.7.1 in the Service Handbook.)

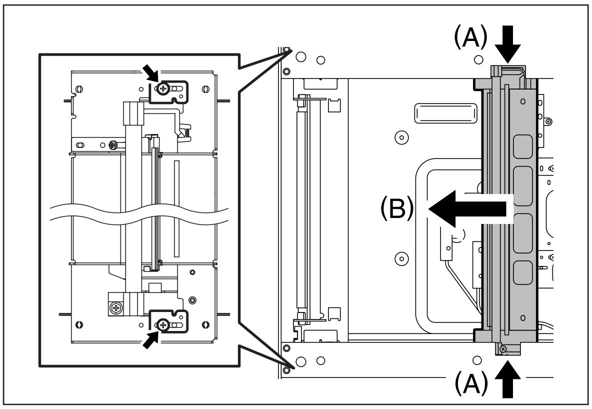


Fig. 6-719

[H] Mirror-1

(1) Take off the carriage-1 (▶ Chapter 6.7 [G]).

Note:

When replacing the mirror-1, replace the carriage-1 together with mirror-1.

Mirror-1 should not be removed.

[I] INV board

(1) Take off the carriage-1 (▶ Chapter 6.7 [G]).

(2) Disconnect 2 connectors.

(3) Remove 2 screws and take off the INV board.

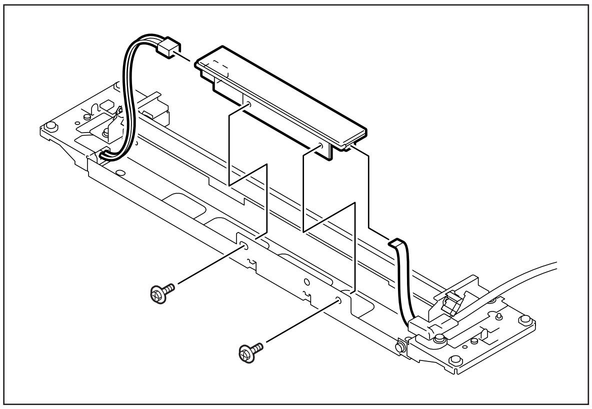


Fig. 6-720

[J] Carriage wire / Carriage-2

(1) Take off the carriage-1 (▶ Chapter 6.7 [G]).

(2) Install the wire holder jig to each pulley on front and rear sides, not to loosen the carriage wire.

Note:

Refer to “3.9 Adjustment of Carriages” in the Service Handbook for the installation direction of the wire holder jig.

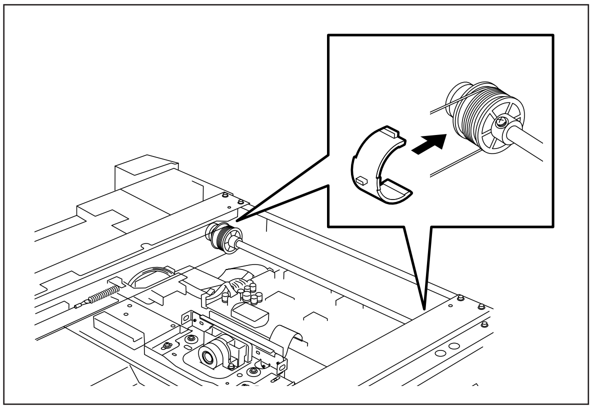


Fig. 6-721

(3) Remove the tension springs on both front and rear sides.

(4) Remove the carriage wires on both front and rear sides.

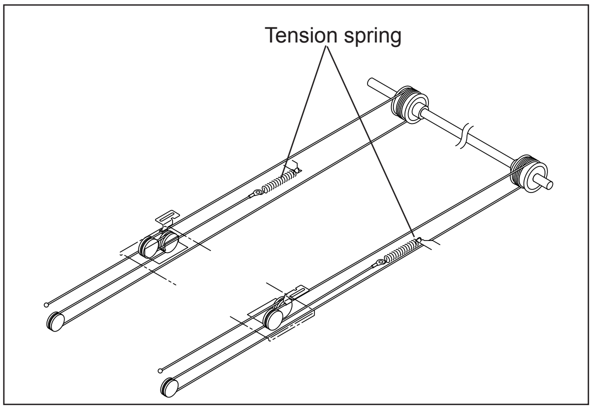


Fig. 6-722

(5) Rotate the carriage-2 in the direction where the inside of the frame is dented shown in the figure at right, not to touch the mirror. Then take off the carriage-2.

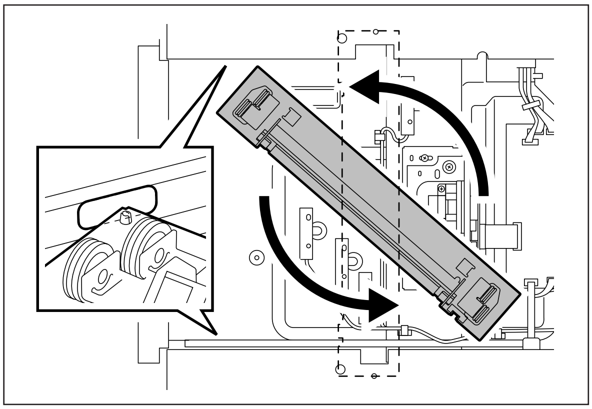


Fig. 6-723

[K] Mirrors-2 and -3

(1) Take off the carriage-2 (▶ Chapter 6.7 [J]).

Note:

When replacing the mirrors-2 and -3, replace the carriage-2 together with mirrors-2 and -3.

Mirrors-2 and -3 should not be removed.

[L] Platen sensor / Carriage home position sensor

(1) Take off the rear cover and upper rear cover (▶ Chapter 2.5.1 [C][G]).

(2) Disconnect 1 connector from the platen sensor on the left rear position of the equipment upper side.

(3) Release the latches of the sensor from the frame and take off the platen sensor.

(4) Disconnect 1 connector from the carriage home position sensor on the left rear position of the equipment upper side.

(5) Release the latches of the sensor from the frame and take off the carriage home position sensor.

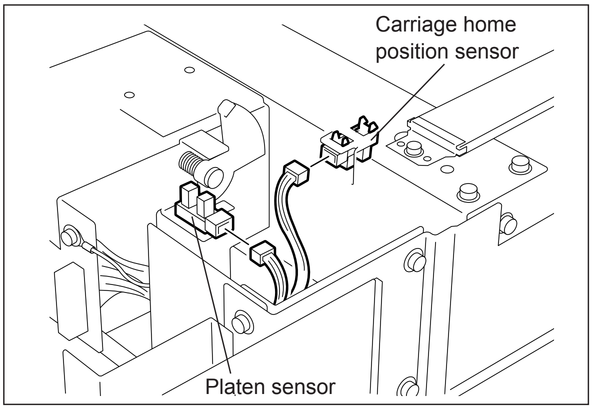


Fig. 6-724

[M] SLG board

(1) Take off the lens cover (▶ Chapter 6.7 [B]).

(2) Disconnect 8 connectors from the SLG board.

(3) Remove 6 screws and take off the SLG board.

Note:

The SLG board for e-STUDIO350/450 and the one for e-STUDIO352/353/452/453 are different. To avoid confusion, the color of the connector CN19 on the SLG board for e-STUDIO352/353/452/453 is yellow.

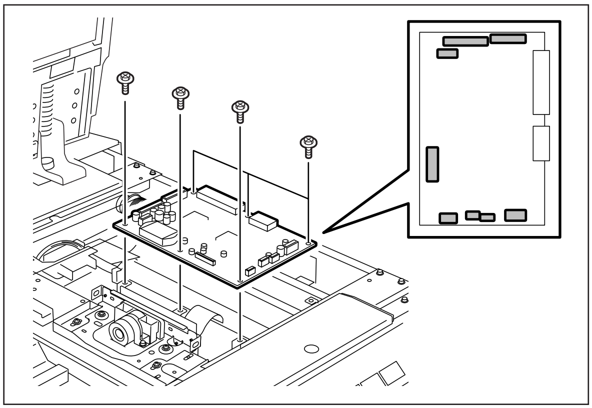


Fig. 6-725

7. IMAGE PROCESSING

7.1 General Description

The following diagram shows the process of the equipment from scanning of original to writing data on the photoconductive drum surface.

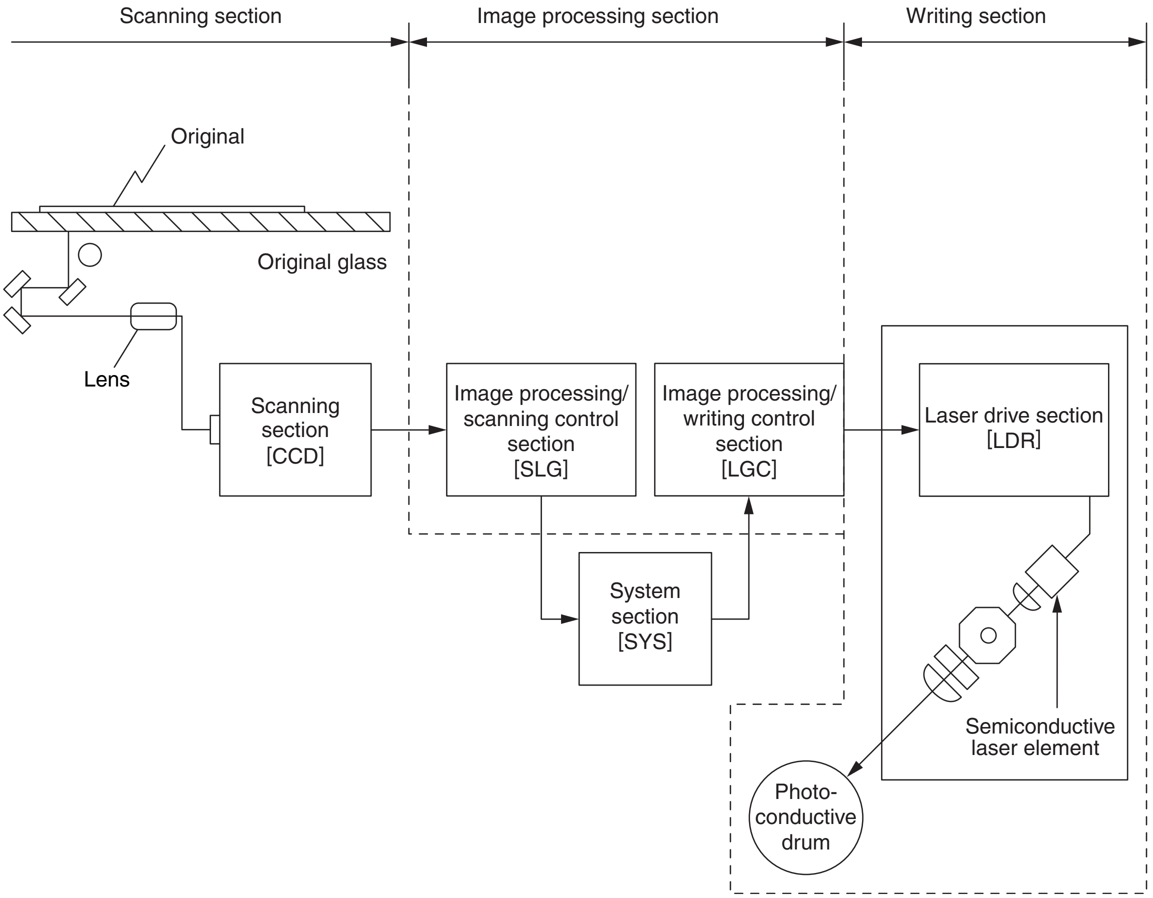

Scanning section
Image processing section
Writing section
Original
Original glass
Lens
Scanning section [CCD]
Image processing/ scanning control section [SLG]
Image processing/ writing control section [LGC]
Laser drive section [LDR]
System section [SYS]
Semiconductive laser element
Photo-conductive drum

Fig. 7-101

The followings are the boards used for image processing.

Board	Function
SLG board	High quality image processing, image memory editing, editing processing, gamma correction, gradation processing, scanner high quality image processing and external output system interface
LGC board	Smoothing processing, external input system interface, image area control, laser related control and printer high quality image processing

Image of an original placed on the original table is scanned by the optical system. The CCD (Charge Coupled Device) reads the optical image signals and converts them into the electrical signals. The electrical signals are amplified and undergo analog-to-digital conversion, then are changed into digital signals. Shading correction (correction of variance in CCD elements and the light source) is performed and the digital signal is output as an image signal from the scanning section.

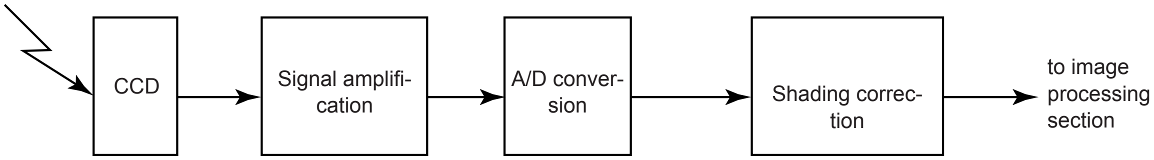


Fig. 7-102

The image processing section inputs the image signal from the scanning section and applies various image processing on the signal, then transmits the output result to the writing section.

Images are processed by the SLG board and LGC board in this equipment. The image signal read in the scanning function is processed in SLG board and the printer image signal is processed in the SYS board.

7.2 Configuration

The following diagram shows the image processing section of this equipment.

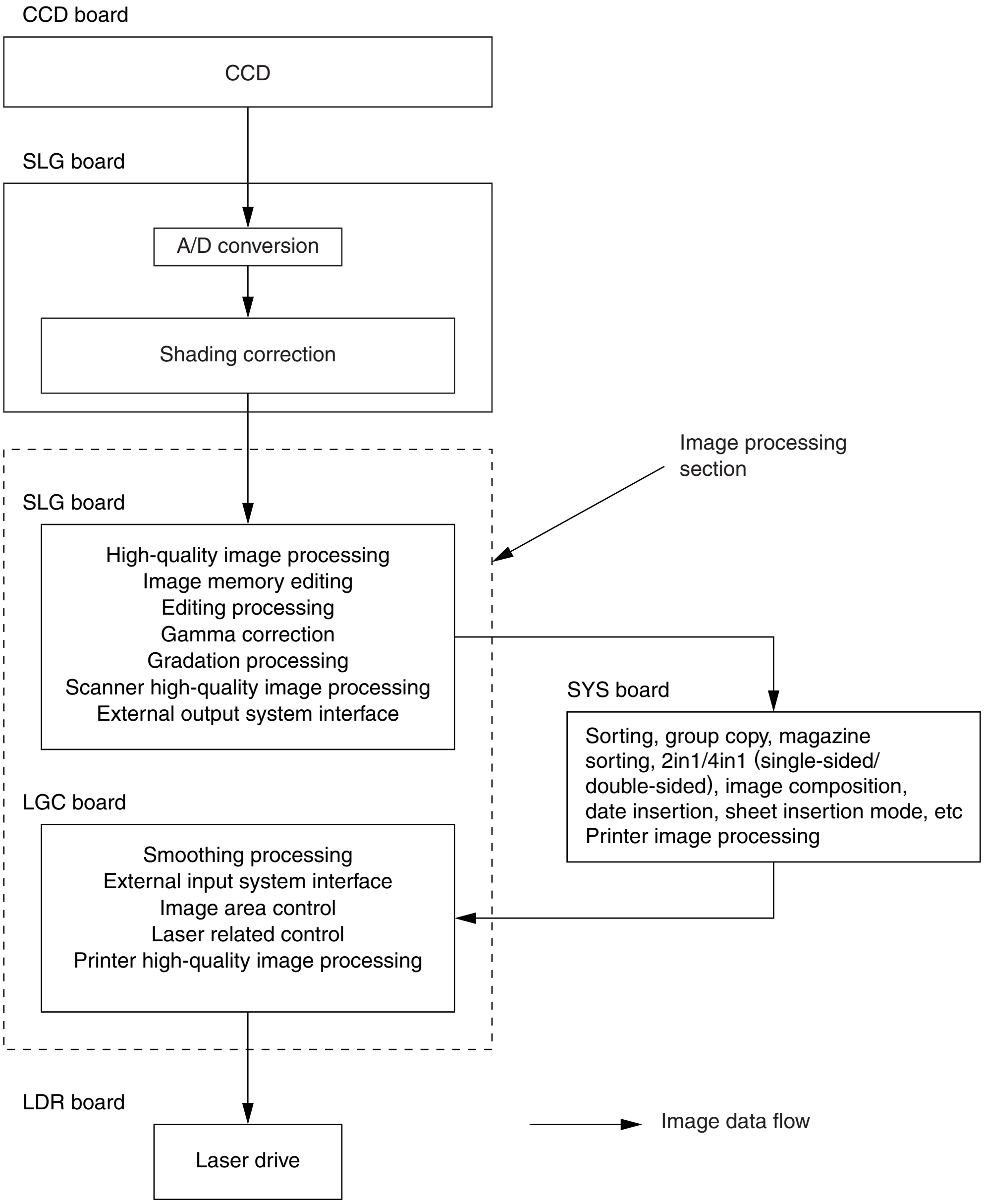

CCD board
CCD
SLG board
A/D conversion
Shading correction
Image processing section
SLG board
High-quality image processing
Image memory editing
Editing processing
Gamma correction
Gradation processing
Scanner high-quality image processing
External output system interface
SYS board
Sorting, group copy, magazine sorting, 2in1/4in1 (single-sided/double-sided), image composition, date insertion, sheet insertion mode, etc
Printer image processing
LGC board
Smoothing processing
External input system interface
Image area control
Laser related control
Printer high-quality image processing
LDR board
Laser drive
Image data flow

Fig. 7-201

7.3 SLG Board

7.3.1 Features

(1) The image processing section on the SLG board is controlled by the CPU on the SLG board.

(2) The image processing section on the SLG board realizes the following when functioning the equipment:

- High quality image processing
- Image memory editing
- Editing processing
- Gamma correction
- Gradation processing
- External output system interface

7.3.2 Functions of image processing circuit

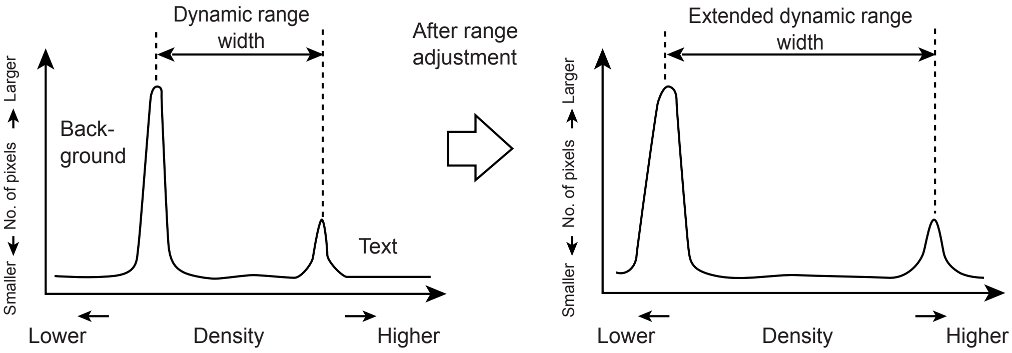
The image processing section mounted on the SYS board realizes the followings:

(1) High quality image processing

(a) Background processing function (Rauge correction)

This function removes undesirable background so that the original can be reproduced appropriately. By using the background adjustment function while manually adjusting the image density, undesirable background of the original can be removed if any, and some necessary but disappeared background can be recovered. By using this function, it is possible to cut the background density down to zero when copying originals which have a certain level of background density, such as newspapers.

<Example>



Histogram
Fig. 7-301

(b) Filtering

This function is enabled by low-pass filter processing and high-pass filter processing.

- Low-pass filter processing

  This processing removes image/electrical noise and decreases moire by performing averaging operation between the image signals of the targeted pixel and those of the neighboring pixels to enhance the reproducibility of original.

<Example> Density of the targeted pixel position is X. Density of pixel positions at front and back of the targeted pixel are “a” and “b” respectively. X is converted to X’ through the low pass filtering.

When the matrix is (3 x 1):

a	x	b

$$x' = \frac{a + b + x}{3}$$

The above averaging operation is performed for all the pixels to accomplish the high reproducibility of original.

(The following is the case that the low pass filtering is applied on the primary scanning pixel.)

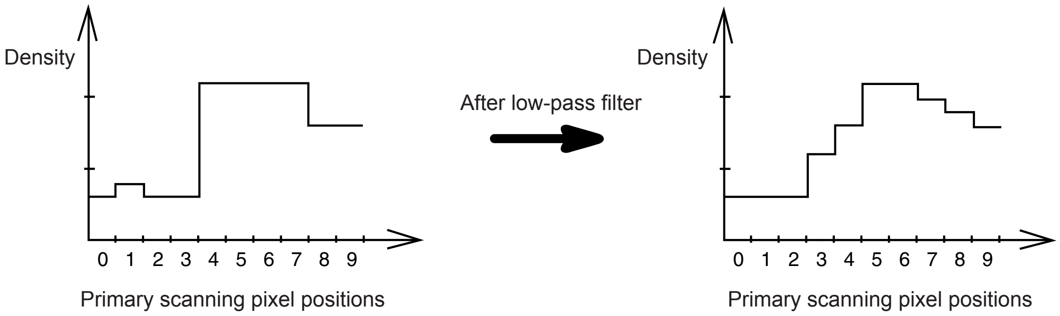


Fig. 7-302

- High-pass filter processing

  Character outline blurs when the original, such as text, with big difference in density among the pixels is optically scanned and output from the CCD. Characteristic of the lens and other factors cause this phenomenon. In this equipment, processing such as edge enhancement is applied between the targeted pixel and the neighboring pixels to eliminate this phenomenon and realize high reproducibility of original.

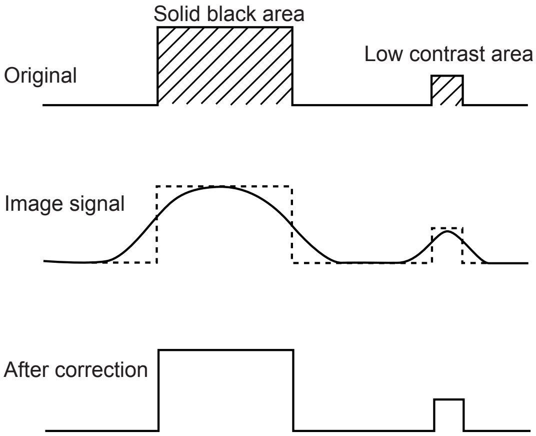


Fig. 7-303

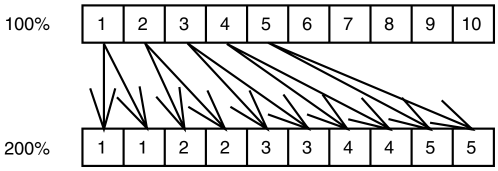
(2) Image memory editing

This function performs editing such as enlargement/reduction, mirror imaging, etc., by using a line memory. Pixel data for one line in the primary scanning direction is stored in the line memory and the memory is renewed at each line.

(a) Enlargement/Reduction

Enlargement/Reduction is accomplished by using the line memory control function in the process of the image processing operation.

<Example> Enlargement



<Example> Reduction

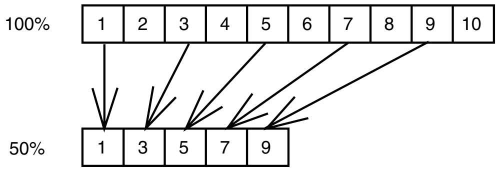


Fig. 7-304

(b) Mirror imaging

This is accomplished by reading and outputting data from its end.

(3) Editing processing

This function performs trimming and masking.

(a) Trimming

Using rectangular area signals, the image signals inside the rectangular area are left and the other image signals are eliminated.

(b) Masking

Using rectangular area signals, the image data inside the rectangular area are erased.

(c) Negative/positive reversing

This function reverses the entire date from negative to positive or vice versa.

(4) Gamma correction

This function corrects the input/output characteristics of the scanner/printer and adjusts the image signals so that the input/output characteristics would match with the copy mode.

(5) Gradation processing

This function switches the type of gradation processing depending on the copy mode: A type which selects the printer characteristics giving the priority to resolution such as for text data, and another which selects the printer characteristics giving the priority to gradation reproducibility such as for photographic images.

(6) External output system interface

This function controls the output of the output interface.

(7) Scanner high quality image processing

This function corrects the image signals scanned by the scanner and reproduces them in a higher image quality.

7.4 LGC Board

7.4.1 Features

(1) The image processing section on the LGC board is controlled by the CPU mounted on the LGC board.

(2) The image processing functions of the LGC board realizes the followings:
- Smoothing processing
- External input system interface
- Image area control
- Laser related control
- Printer high quality processing

7.4.2 Functions of image processing circuit

The image processing section mounted on the LGC board realizes the followings:

(1) Smoothing processing
This function removes jagginess and smoothes character outline of images input from the external input system interface, and output them.

(2) External input system interface
This function controls the input of the input interface.

(3) Image area control
This function sets the effective image area in horizontal and vertical directions to be output.

(4) Laser related control
This function performs the APC (Auto Power Control).

(5) Printer high quality processing
This function reproduces the image signals output from the printer controller sharper.

7.5 Laser Driving PC Board (LDR board)

Image signals processed on the LGC board are then processed by ASIC for writing control and Laser driving PC board. The signal is then laser controlled and written on the drum.

(1)	Setting of effective image area	• Top, bottom, left and right margins
(2)	Horizontal synchronization signal (H-Sync) clock generation section	• Reference clock signal in the printer section synchronized with H-Sync and its signal.
(3)	Laser drive section	• ON/OFF control of the semiconductive laser and APC (Auto Power Control).

8. LASER OPTICAL UNIT

8.1 General Description

The laser optical unit radiates the laser beam onto the photoconductive drum responding to the digital image signals transmitted from the scanner, printer controller, etc. to create the latent image. Image signal is converted into the light emission signal of the laser diode on the laser drive PC board, then radiated on the drum through the optical elements such as cylinder lens, polygonal mirror and fθ lenses.

The unit must not be disassembled in the field as they are very sensitive to dust and finely adjusted at the factory.

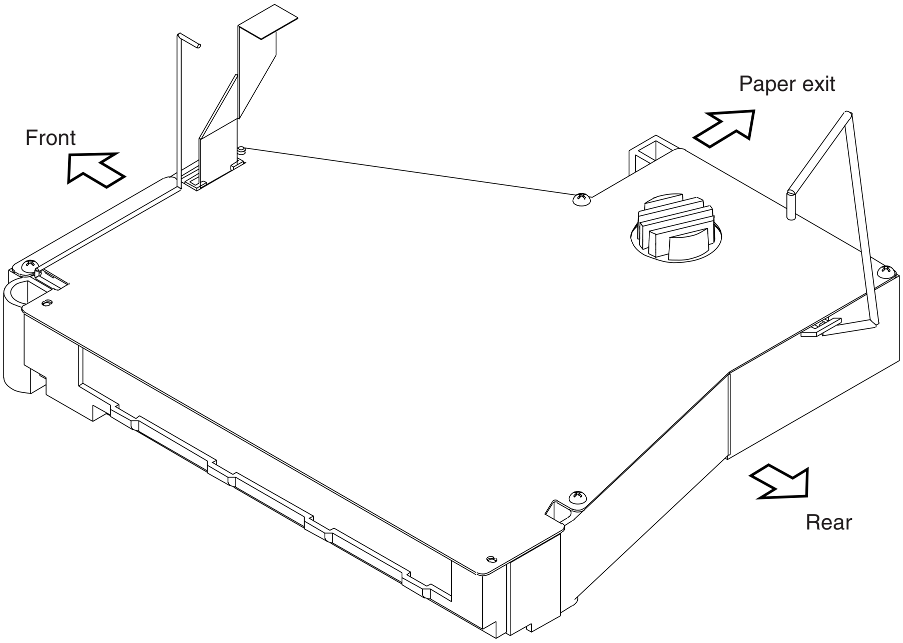


Fig. 8-101

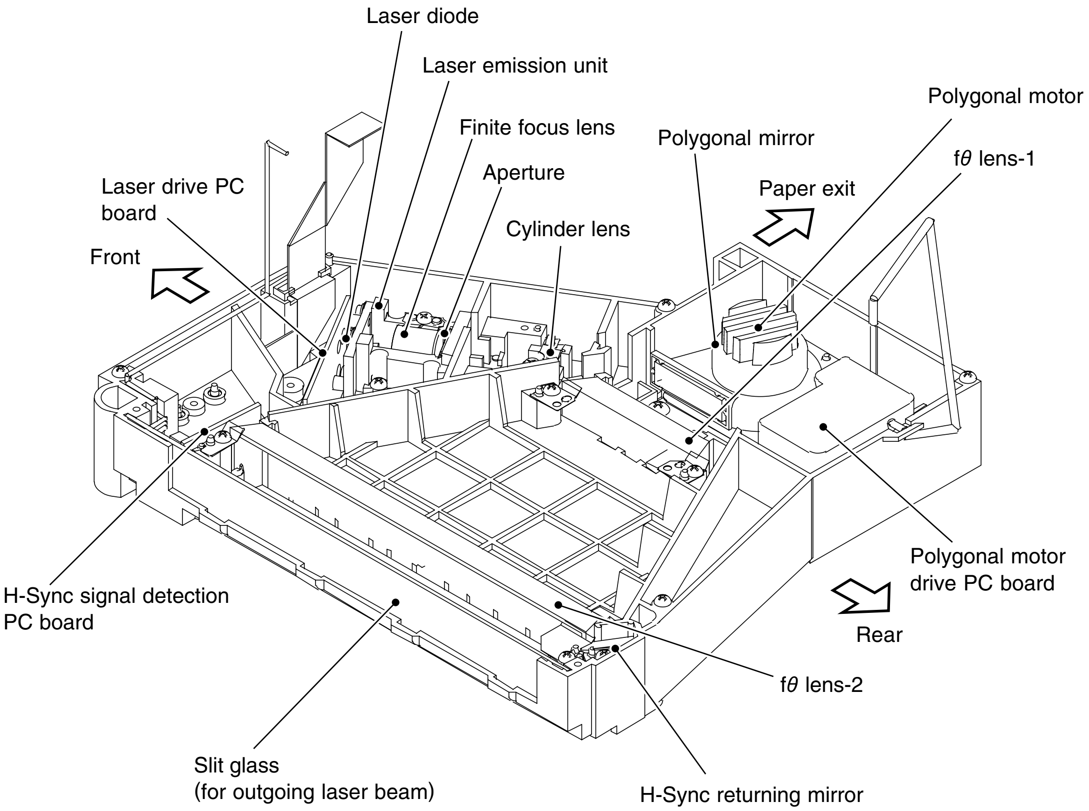

Laser diode
Laser emission unit
Finite focus lens
Aperture
Cylinder lens
Laser drive PC board
Front
Polygonal mirror
Polygonal motor
fθ lens-1
Paper exit
Polygonal motor drive PC board
Rear
fθ lens-2
H-Sync signal detection PC board
Slit glass (for outgoing laser beam)
H-Sync returning mirror

Fig. 8-102

8.2 Structure

(1) Laser emission Unit

This unit consists of the laser diode, finite focus lens, aperture and cylinder lens.

a. Laser diode

This laser diode features low droop, small laser variation and low threshold current.

Aperture determines the shape of the laser beam at laser emission position of the primary scanning and secondary scanning.

Laser diode radiates the laser beam responding to the laser emission control (ON/OFF) signal from the laser driving PC board. Laser beam which passed through the finite focus lens is focused on the drum surface.

b. CAUTION

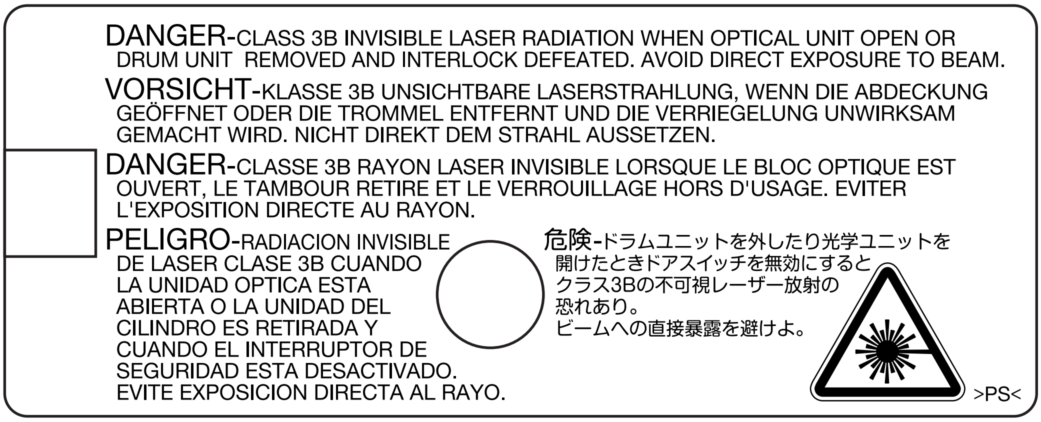
The beam of the semiconductor laser is very weak (about 5 mW), but focused parallel rays creates great energy which is hazardous.

Some material of the components of the laser optical unit are metal. Since the unit is in a sealed container, there is no danger of laser leakage during normal operation.

Note:

Laser beam is not visible. Pay the closest attention when handling the laser unit components or performing operations such as adjustment of the laser beam, and this kind of operations are very dangerous and must be performed only by specially trained staff.

The warning label shown below is attached on the inner housing at the front side of the equipment.



DANGER-CLASS 3B INVISIBLE LASER RADIATION WHEN OPTICAL UNIT OPEN OR DRUM UNIT REMOVED AND INTERLOCK DEFEATED. AVOID DIRECT EXPOSURE TO BEAM.

VORSICHT-KLASSE 3B UNSICHTBARE LASERSTRAHLUNG, WENN DIE ABDECKUNG GEÖFFNET ODER DIE TROMMEL ENTFERNT UND DIE VERRIEGELUNG UNWIRKSAM GEMACHT WIRD. NICHT DIREKT DEM STRAHL AUSSETZEN.

DANGER-CLASSE 3B RAYON LASER INVISIBLE LORSQUE LE BLOC OPTIQUE EST OUVERT, LE TAMBOUR RETIRE ET LE VERROUILLAGE HORS D'USAGE. EVITER L'EXPOSITION DIRECTE AU RAYON.

PELIGRO-RADIACION INVISIBLE DE LASER CLASE 3B CUANDO LA UNIDAD OPTICA ESTA ABIERTA O LA UNIDAD DEL CILINDRO ES RETIRADA Y CUANDO EL INTERRUPTOR DE SEGURIDAD ESTA DESACTIVADO. EVITE EXPOSICION DIRECTA AL RAYO.

危険-ドラムユニットを外したり光学ユニットを開けたときドアスイッチを無効にするとクラス3Bの不可視レーザー放射の恐れあり。ビームへの直接暴露を避けよ。

>PS<

Fig. 8-201

[CAUTION]

- Do not approach tools near the path of the laser beam.
- Take off your watches, rings, bracelets, etc. before handling the unit.

(2) Polygonal motor unit

This unit consists of the polygonal motor, polygonal mirror and polygonal mirror cover.

a. Polygonal motor

This motor rotates the polygonal mirror in high speed.

The DC motor controls the rotation speed of the mirror motor as follows:

During ready: 10,000.00 rpm
During printing: 38,090.55 rpm (600dpi)
: 38,951.37 rpm (FAX 15.4 × 16.0 dot/mm)
: 37,490.70 rpm (FAX 16.0 × 15.4 dot/mm)

b. Polygonal mirror

One laser beam emitted from the laser diode is reflected by this mirror. As the polygonal mirror is rotated by the polygonal motor, the reflected laser beam moves in sync with the rotation. The direction of the movement is the primary scanning direction of the image. One scan is performed on one plane of the polygonal mirror.

As the polygonal mirror has eight planes, eight scans are performed in one rotation of the polygonal mirror.

c. Polygonal mirror cover

Polygonal mirror cover reduces the windage loss and noise, prevents adhesion of foreign objects onto the mirror surface and releases heat.

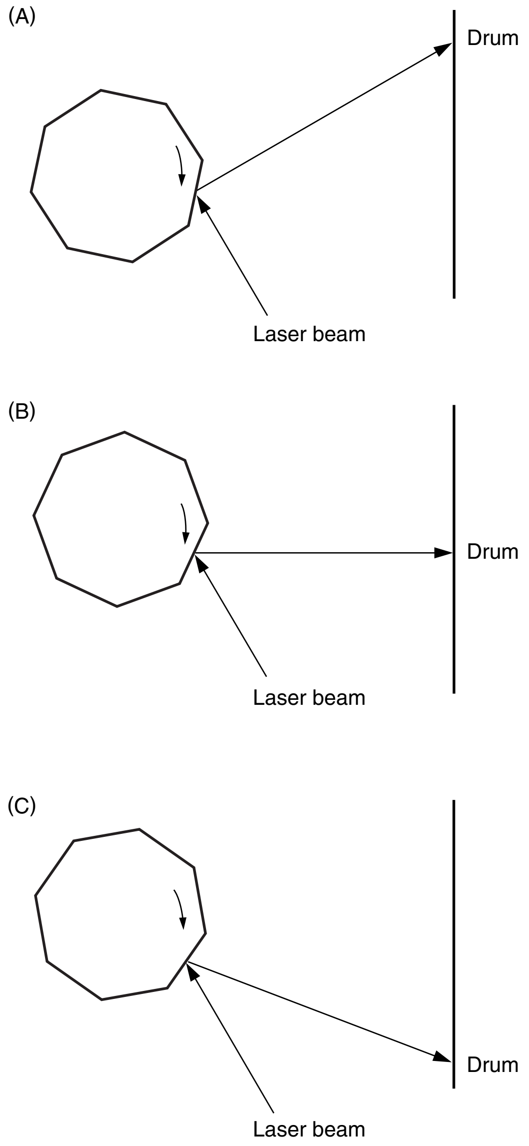


Fig. 8-202

One scan is completed by completion of steps (A) to (C). One scan is performed on one plane of the polygonal-mirror. Eight scans can be made with one rotation of the polygonal mirror.

(3) fθ lenses-1 and -2

These two lenses perform the following adjustment on the laser beam reflected by the polygonal mirror.

a. Uniform-velocity scanning

Since the polygonal mirror is rotating at a uniform velocity, the laser beam reflected from the mirror scans over the drum surface at a uniform angular velocity; namely, the pitch between the dots on the drum is wider at both ends than at the center of the scanning range. The fθ lenses help to correct this difference, making all the dot-to-dot pitches equal on the drum surface.

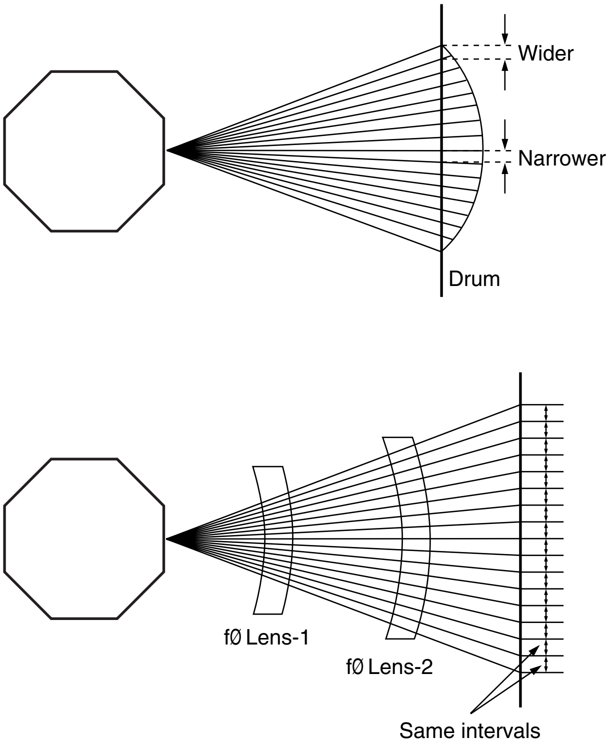


Fig. 8-203

b. Face tilt correction

The reflecting face of the polygonal mirror is tilted slightly to one side against the perfect vertical. Horizontal deviation of the laser beam which is caused by the tilt is corrected.

c. Sectional shape of laser beam

The shape of the laser beam spotted on the drum is adjusted.

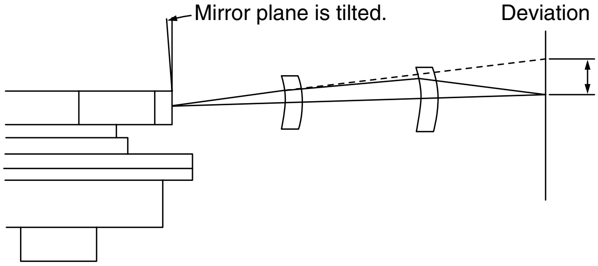


Fig. 8-204

(4) H-Sync signal detection PC board

The laser beam which is started to be scanned from one of the reflected plane of the polygonal mirror is reflected by the H-Sync detection mirror and enters the PIN diode on the H-Sync signal detection PC board. The primary scanning synchronizing signal is generated based on this reflection.

(5) Laser Driving PC Board

This control board has the following functions:

a. APC control function (adjusts disparity of the laser intensity caused by temperature)

b. Laser ON/OFF function

(6) Slit glass

Slit glass is located where the laser beam is output from the laser optical unit, and it protects the unit from dust.

8.3 Laser Diode

The laser used in this equipment is a AlGaAs type semiconductive laser. It is generated in the single-horizontal mode, and its wavelength is approx. 785 nm. This semiconductive laser outputs 5mW with standard DC power supply. Laser intensity is controlled by using the output from the PIN diode for monitoring light output in the semiconductive laser.

The relation between the current and optical output of the semiconductive laser is as shown at right. Light emission is started when the forward current reaches or becomes larger than the threshold current and outputs the monitor current which is proportionate to the optical output. The threshold current and monitor current differs depending on each semiconductive laser. So optical output has to be adjusted to maintain a constant value.

Since the optical output of the semiconductive laser is decreased as the temperature of the laser rises, APC control needs to be performed to maintain a constant optical output.

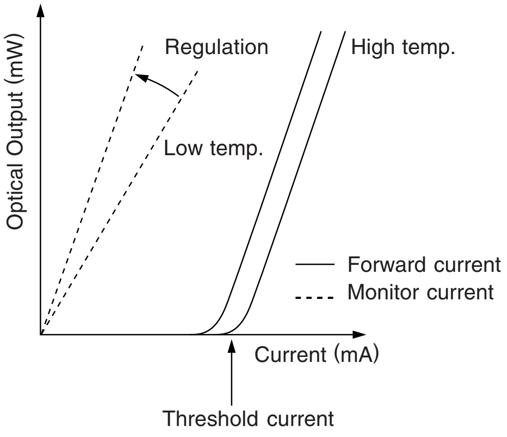


Fig. 8-301

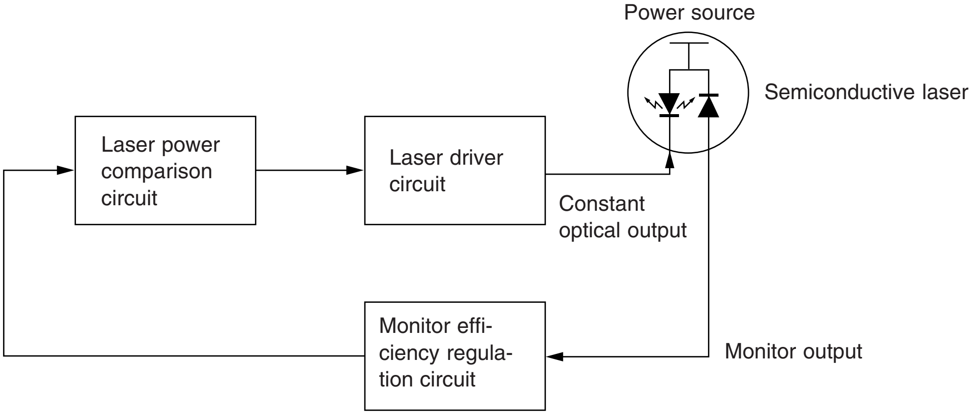


Fig. 8-302

Fig. 8-302 shows a block diagram of the semiconductive laser control circuit. The semiconductive laser performs monitor efficiency regulation (a process to control monitor current for the light amount), and laser itself is adjusted to initial output emission of approx. 2.11 mW (approx. 421 μW on the drum surface). The regulated voltage of the monitor output is fed back to the laser power comparison circuit. This monitor output voltage is compared with the laser power voltage set for the control circuit for every scanning. Laser driver circuit increases the forward current if the laser power is insufficient, and decreases the current when the power is excessive to maintain a constant optical output.

8.4 Laser Optical Unit Cooling Fan

The laser optical unit cooling fan is a propeller fan (80 x 80 mm). It cools down the polygonal motor and the drive PC board.

8.5 Polygonal Motor

(1) Drive circuit of the polygonal motor

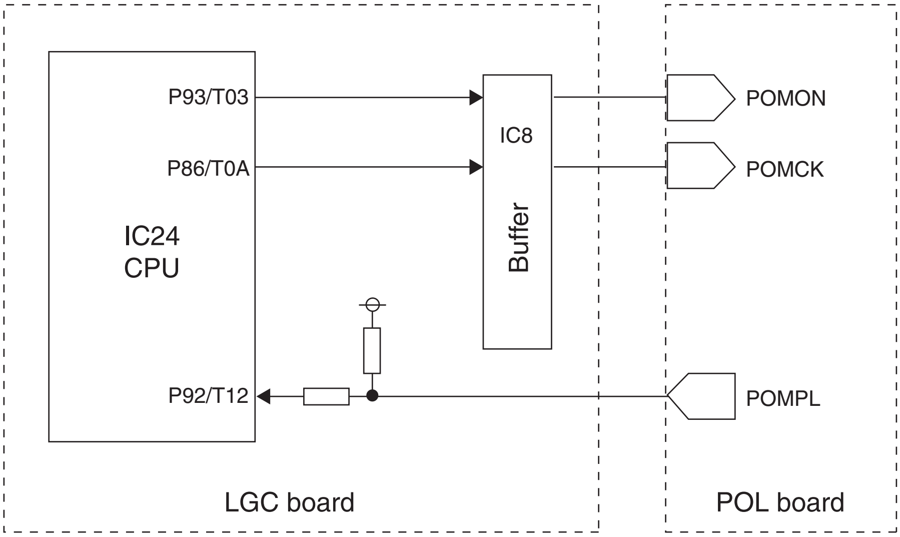

P93/T03
P86/T0A
IC24
CPU
IC8
Buffer
P92/T12
POMON
POMCK
POMPL
LGC board
POL board

Fig. 8-501

(2) Control signal

The polygonal motor is a DC motor which is PLL-controlled by clock signals. The signals from LGC board control the polygonal motor.

Signal	Level “L”	Level “H”	Remarks
POMON	ON	OFF	Polygonal motor ON signal
POMCK	—	—	Polygonal motor reference clock signal
POMP	Normal rotation	Abnormal rotation	Polygonal motor PLL signal

8.6 Disassembly and Replacement

[A] Laser optical unit

(1) Take off the receiving tray
(► Chapter 2.5.1 [H]).

(2) Take off the front left cover
(► Chapter 2.5.1 [B]).

(3) Disconnect the connector with lock (CN206) and connector (CN207) on the LRL PC board.

(4) Disconnect the joint connector between the laser unit fan and polygonal motor.

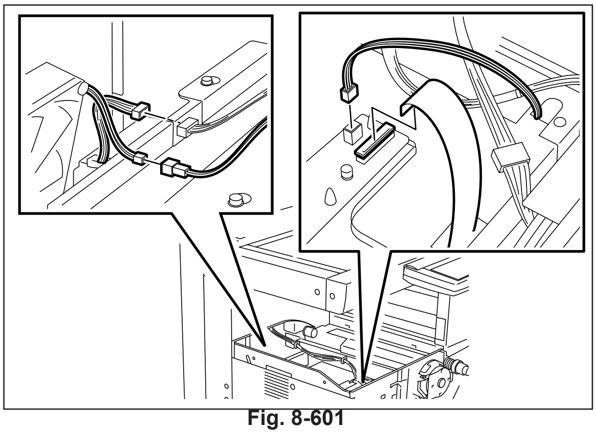


Fig. 8-601

(5) Remove 1 screw on the front side and loosen 1 screw on the rear side.

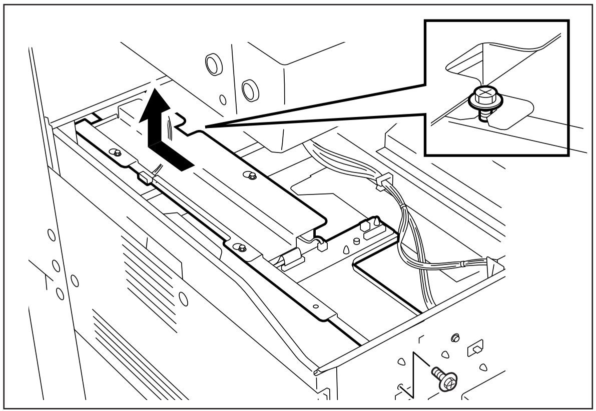


Fig. 8-602

(6) Stand the laser optical unit against the rear side of the equipment by moving the relay stay to the rear side. Be careful not to fold the cable on the relay stay rear side.

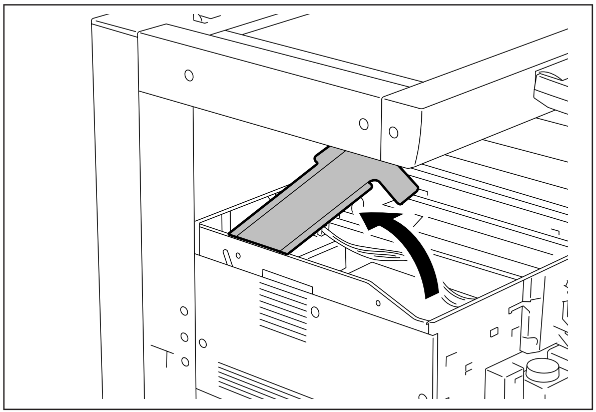


Fig. 8-603

(7) Remove 3 screws with spring. Lift up the laser optical unit, avoiding contact with the laser unit fan.

Note:

1. Do not leave fingerprints or stain on the slit glass.
2. Laser optical unit is a precise apparatus. Handle the unit with extra care not to shock or vibrate it.
3. Never attempt to disassemble the unit in the field since it is very sensitive to the dust and stain.
4. When installing, fix the laser optical unit with the screws securely by matching the bosses on the bottom of the unit with the holes of the frame.

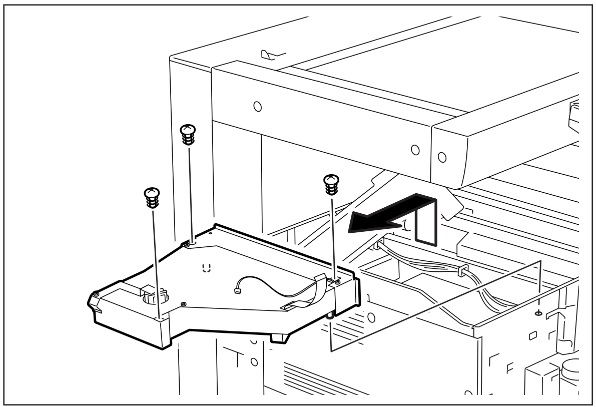


Fig. 8-604

[B] Laser unit fan

(1) Take off the receiving tray
(► Chapter 2.5.1 [H]).

(2) Disconnect 1 connector.

(3) Remove 2 screws and take off the laser unit fan.

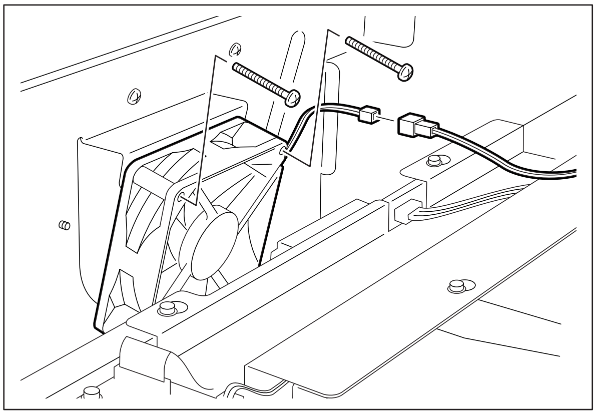


Fig. 8-605

[C] LRL PC board

(1) Take off the receiving tray
(► Chapter 2.5.1 [H]).

(2) Disconnect 2 connectors with lock (CN204 and CN206) and 1 connectors (CN207).

(3) Remove 1 screw. Take off the LRL PC board by releasing 2 locking supports.

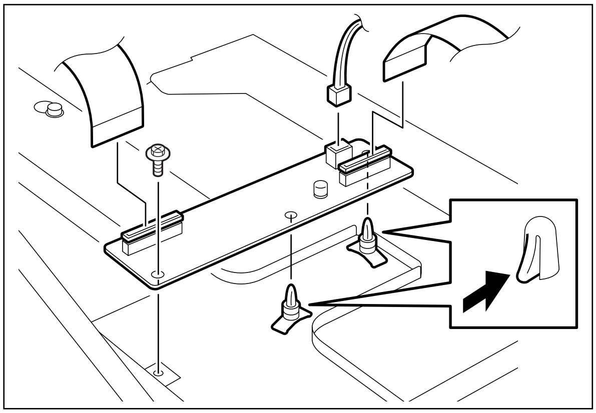


Fig. 8-606

9. PAPER FEEDING SYSTEM

9.1 Functions

The purpose of this system is to pick up a sheet of paper from the drawer or bypass tray and transport it to the transfer position. The paper feeding system mainly consists of the pickup roller, feed roller, separation roller, transport roller, registration roller, bypass paper sensor, drawer empty sensor, drawer paper stock sensor, feed sensor, registration sensor and the drive system for these components.

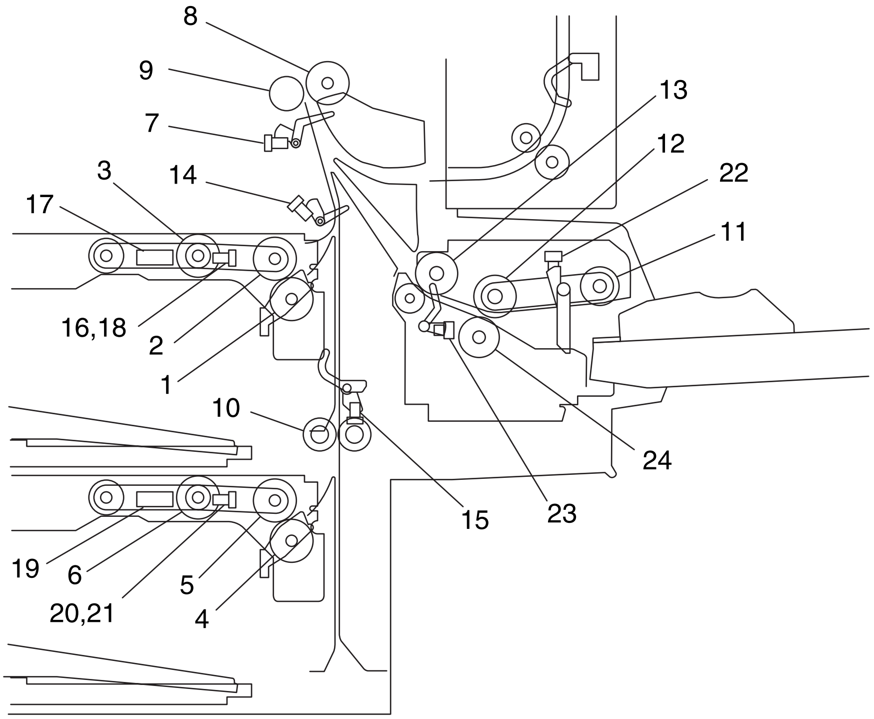


Fig. 9-101

Sectional view of paper feeding section (Front side)

No.	Name	No.	Name
1	Upper drawer separation roller	13	Bypass transport roller
2	Upper drawer feed roller	14	Upper drawer feed sensor
3	Upper drawer pickup roller	15	Lower drawer feed sensor
4	Lower drawer separation roller	16	Upper drawer empty sensor
5	Lower drawer feed roller	17	Upper drawer paper stock sensor
6	Lower drawer pickup roller	18	Upper drawer tray-up sensor
7	Registration sensor	19	Lower drawer empty sensor
8	Registration roller (rubber)	20	Lower drawer paper stock sensor
9	Registration roller (metal)	21	Lower drawer tray-up sensor
10	Transport roller	22	Bypass paper sensor
11	Bypass pickup roller	23	Bypass feed sensor
12	Bypass feed roller	24	Bypass separation roller

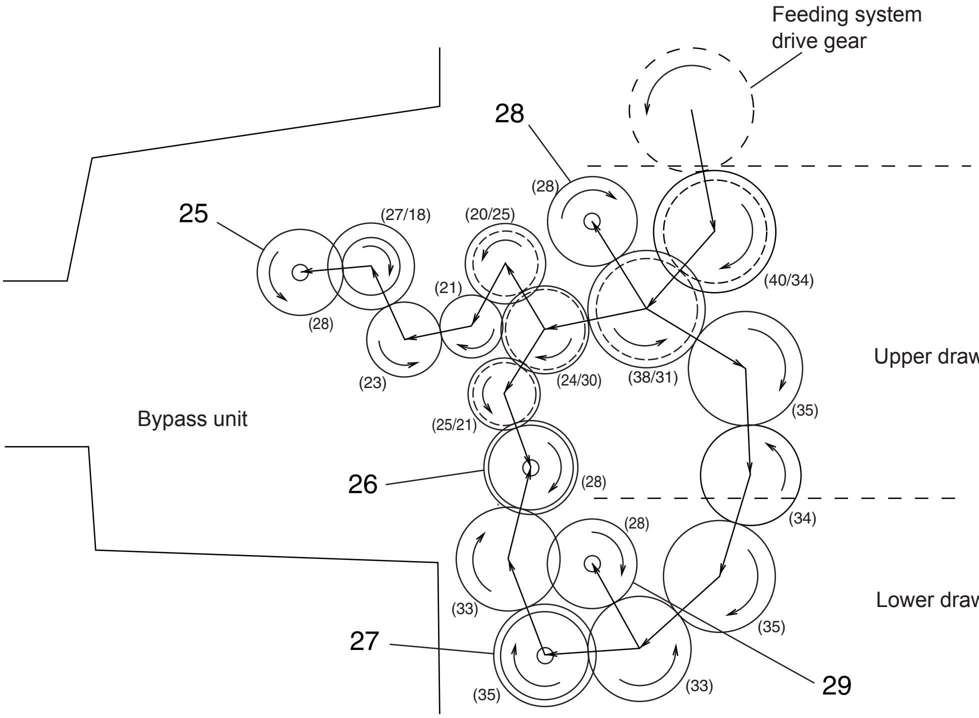

Feeding system
drive gear
28
(28)
25
(27/18)
(20/25)
(40/34)
(21)
(28)
(23)
(24/30)
(38/31)
Upper drawer
(35)
Bypass unit
(25/21)
26
(28)
(34)
(28)
Lower drawer
(33)
(35)
27
29
(35)
(33)

Fig. 9-102

Paper feeding section drive system (Rear side)

No.	Name
25	Bypass feed clutch
26	Transport clutch (Low speed)
27	Transport clutch (High speed)
28	Upper drawer feed clutch
29	Lower drawer feed clutch

(1) Pickup roller
This roller moves up and down to draw out a sheet of paper from the bypass tray or the drawer, and transport it to the feed roller.

(2) Feed roller
This roller transports the paper from the pickup roller to the registration roller.

(3) Separation roller
This roller is mounted against the feed roller. When two sheets of paper or more are transported from the pickup roller, the load of the torque limiter (spring) of the separation roller is greater than the frictional force between the sheets. As the result, the separation roller is stopped and the lower sheet of paper is not transported any further. When only one sheet of paper is transported from the pickup roller, the separation roller is forced to rotate following the feed roller.

(4) Transport roller
This roller transports the paper from the feed roller to the registration roller.

(5) Registration roller
Paper transported from the feed roller is pushed against the registration rollers, which aligns the leading edge of paper. The registration roller then rotates to transport the paper to the transfer section.

The following sensors detect the presence/absence of paper and the position of the paper being transported, to control the ON/OFF of the corresponding rollers.

(6) Bypass paper sensor
This sensor detects whether paper is set in the bypass tray or not. If it is, bypass feeding is performed in preference to drawer feeding.

(7) Bypass feed sensor
This sensor detects whether paper has been transported from the bypass tray or not. It also detects whether the leading/trailing edge of paper has passed the feed sensor or not. This sensor is utilized to detect the jams such as paper misfeeding in the bypass unit.

(8) Drawer empty sensor
This is a transmissive-type sensor which detects the presence/absence of paper in the drawer using an actuator. When there is no paper in the drawer, the actuator blocks the light path of the sensor. Then the sensor determines that there is no paper.

(9) Drawer paper stock sensor

This is a transmissive-type sensor which detects the amount of paper remaining in the drawer using an actuator. When the remaining paper has become around 100 sheets, the actuator blocks the light path of the sensor to notify that the paper quantity is getting less.

(10) Feed sensor

This sensor detects whether the leading/trailing edge of paper has passed the feed roller or not. It also detects jams such as paper misfeeding.

(11) Registration sensor

This sensor detects whether the leading edge of the paper has reached the registration roller or not, and the trailing edge of paper has passed the registration roller or not.

9.2 Operation

9.2.1 Operation of bypass pickup roller

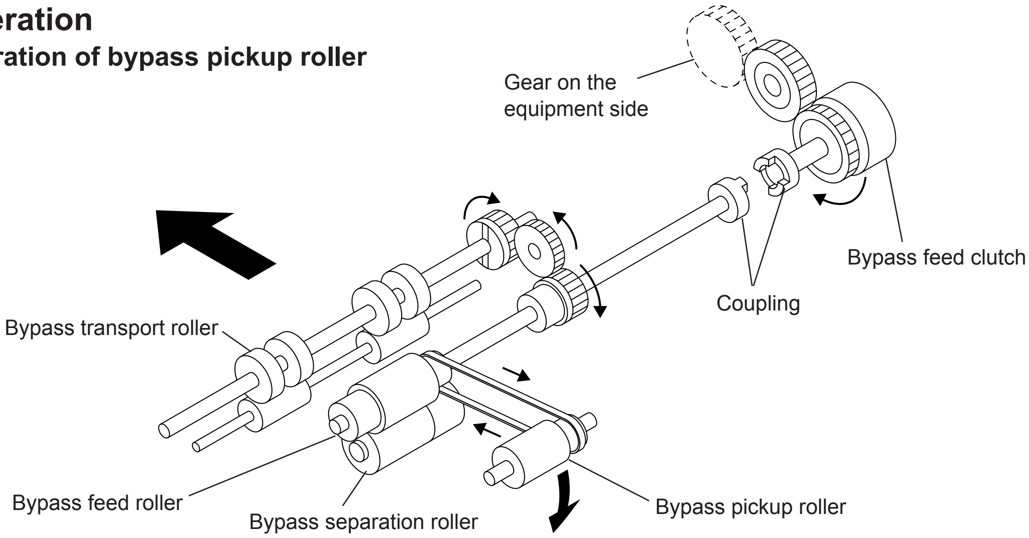

Gear on the equipment side
Bypass feed clutch
Coupling
Bypass transport roller
Bypass feed roller
Bypass separation roller
Bypass pickup roller

Fig. 9-201

When the paper is set on the bypass tray, the bypass feed sensor detects the presence of the paper. Then the bypass pickup solenoid is turned ON and the pickup arm falls by its own weight. At this time, when the bypass feed clutch is turned ON, the drive from the equipment is transmitted to the pickup roller through the coupling and timing belt. Then the paper is picked up.

The paper picked up is transported to the transport path on the equipment side by the feed roller and transport roller.

When there is no paper remaining on the bypass tray, the bypass pickup solenoid is turned OFF and the pickup roller returns by the spring force.

The separation roller works not to transport paper more than one sheet at a time.

9.2.2 Operation of drawer pickup roller

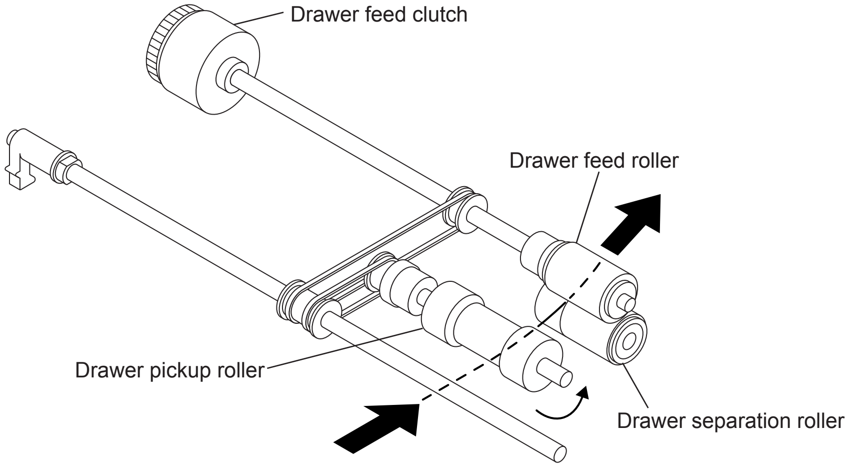

Drawer feed clutch
Drawer feed roller
Drawer pickup roller
Drawer separation roller

Fig. 9-202

When the drawer is inserted, the pickup roller and roller holder fall by the spring force. Then the drawer tray lifts up and paper feeding is enabled.

When the drawer feed clutch is turned ON, the drive from the equipment is transmitted. Then the feed roller and pickup roller rotate to transport the paper from the drawer.

The separation roller under the feed roller prevents multiple transporting of paper.

9.2.3 Separation of paper

The separation roller in this equipment works to separate the sheets of paper being fed. The separation roller section consists of the feed roller, separation roller, spring joint, etc. The feed roller rotates in the direction of the white arrow (shown below in the figure at right) at the same timing as the pickup roller rotation when the feed clutch is turned ON.

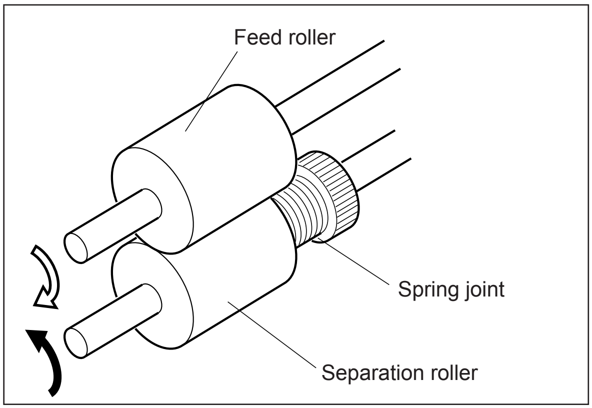


Fig. 9-203

When two sheets of paper are transported (shown above in the figure at right), the lower sheet is braked by the separation roller and not transported any further and the upper sheet is transported in the direction of black arrow since the frictional force between two sheets is small.

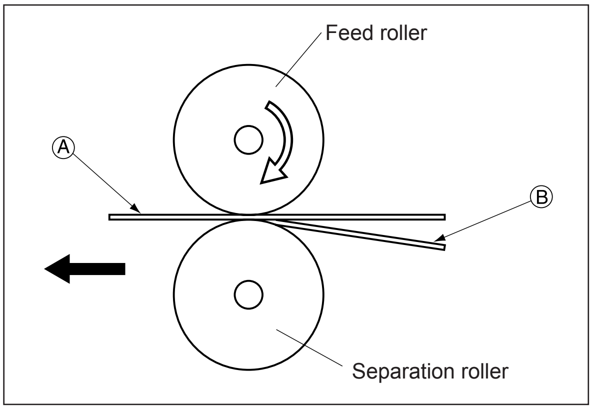


Fig. 9-204

(Example)

When only one sheet enters into the separation roller section:

Since the transporting force of the feed roller is greater than the braking force of the separation roller, these two rollers rotate together to transport the sheet to the registration roller.

When two sheets enter into the separation roller section:

Since the transporting force of the feed roller and the breaking force of the separation roller are greater than the frictional force between two sheets, the sheet A is transported in the direction of the black arrow and the sheet B is braked by the separation roller and is not transported any further.

9.2.4 General operation

[A] From power-ON to ready status

(1) When the equipment is turned ON, the tray-up motor starts to rotate forward and the upper drawer tray starts to rise. When the tray has risen and the tray-up sensor is turned ON (L→H), the tray-up motor is turned OFF, then the tray stops to rising. At this time, if the empty sensor is OFF (L), it is judged that there is no paper in the drawer. If the empty sensor is ON (H), there is paper in the drawer. The tray stops at raised position regardless of the presence/absence of paper.
The tray-up motor then starts to rotate in reverse and the lower drawer tray starts to rise. The lower drawer tray is stopped in the same manner as the upper drawer tray, and the empty sensor detects if there is paper in the drawer.

(2) If the drawer is not completely inserted when the equipment is turned ON, the tray in that drawer does not rise. When the drawer is inserted completely, the tray is raised and checks the presence/absence of paper.

(3) If either of the feed sensors is ON (= there is paper on the transport path) at power-ON, it is determined that a paper jam has occurred and no operation is enabled until the jammed paper is removed.

[B] Ready status

(1) After the tray is moved up to check the presence/absence of paper as described above, the equipment enters the ready state. During the ready mode, the tray stays at the raised position.

(2) When a drawer is inserted or removed in the ready state, the tray is raised again and checks the presence/absence of paper.

[C] Bypass feeding

- The bypass paper sensor detects paper in the bypass tray.
- The bypass pickup roller is lowered when the bypass pickup solenoid is turned ON.
- The bypass feed clutch is turned ON, and then the bypass pickup roller and bypass feed roller are rotated.
- Paper feeding is started and the bypass feed sensor detects the passing of paper.
- The leading edge of paper turns the registration sensor ON and the paper is aligned by the registration rollers.
- The bypass feed clutch is turned OFF, causing the bypass pickup roller and bypass feed roller to stop rotating.
- The bypass pickup solenoid is turned OFF, and the bypass pickup roller moves up.
- The registration clutch is turned ON, and the paper is transported to the transfer unit.

[D] Paper feeding

(D-1) Lower drawer

- The feed clutch and transport clutch (high speed) are turned ON, and the pickup roller, feed roller and transport roller rotate to start paper feeding.
- The leading edge of paper turns the lower drawer feed sensor ON, and the feed clutch and transport clutch (high speed) are turned OFF and then back ON.
- The leading edge of paper turns the registration sensor ON and the paper is aligned by the registration rollers.
- The feed clutch and transport clutch (high speed) are turned ON, and the pickup roller, feed roller and transport roller stop rotating.
- The registration clutch and transport clutch (low speed) are turned ON, and the paper is transported to the transfer unit.

(D-2) Upper drawer

- The feed clutch is turned ON and the pickup roller and feed roller rotate to start paper feeding.
- The leading edge of paper turns the registration sensor ON, and the paper is aligned by the registration rollers.
- The feed clutch is turned OFF and the pickup roller and feed roller to stop rotating.
- The registration clutch is turned ON, and the paper is transported to the transfer unit.

9.3 Drive Circuit of Tray-up Motor

The tray-up motor (T-UP-MTR) is driven by the LGC board IC1 (LGC: TA8428). The block diagram of TA8428 is shown below.

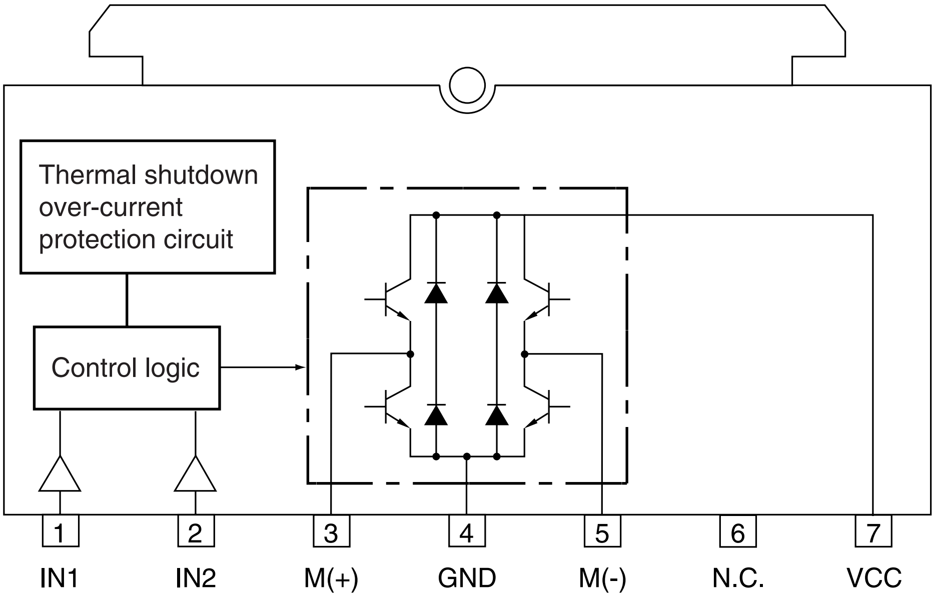

Thermal shutdown over-current protection circuit
Control logic
1
2
3
4
5
6
7
IN1
IN2
M(+)
GND
M(-)
N.C.
VCC

Fig. 9-301

IN1 and IN2 are input terminals to receive the signals from the tray-up motor. The control logic based on the signals from the tray-up motor, controls ON/OFF of the rotation direction.

Input		Output		State
IN1	IN2	M (+)	M (–)	
H	H	L	L	Brake
L	H	L	H	CCW
H	L	H	L	CW
L	L	OFF (high im- pedance)		Stop

9.4 Disassembly and Replacement

[A] Bypass unit

(A-1) Bypass unit

(1) Remove the upper/lower drawer.

(2) Remove 2 screws and take off the right front hinge cover.

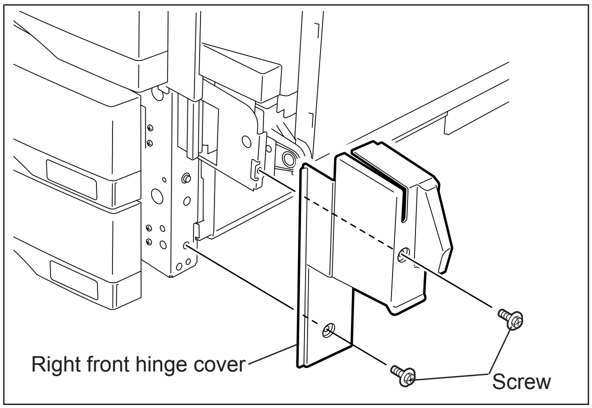

Right front hinge cover
Screw

Fig. 9-401

(3) Remove 2 screws and take off the right rear hinge cover.

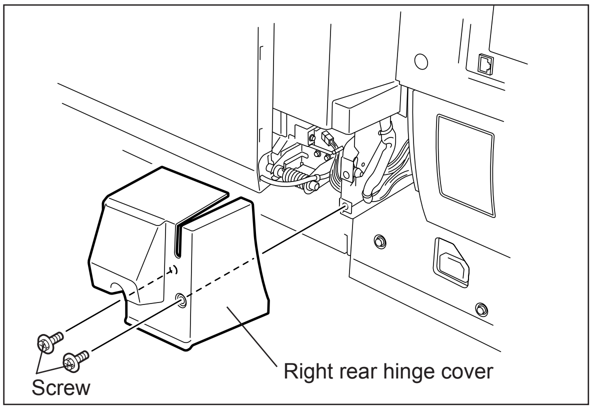

Screw
Right rear hinge cover

Fig. 9-402

(4) Remove 2 screws and take off the right lower cover.

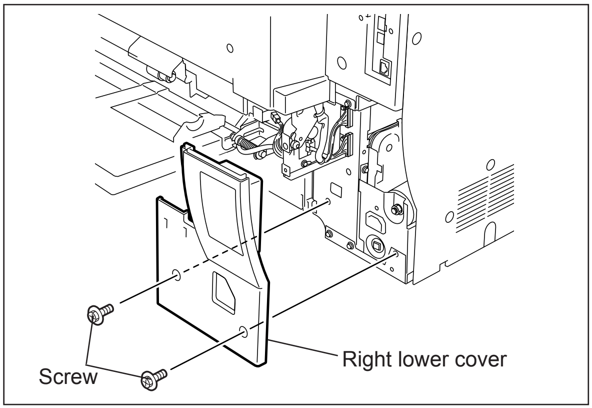

Screw
Right lower cover

Fig. 9-403

(5) Remove 1 screw and take off the 2 ground wires.

(6) Disconnect 1 connector and release the harness from harness clamp.

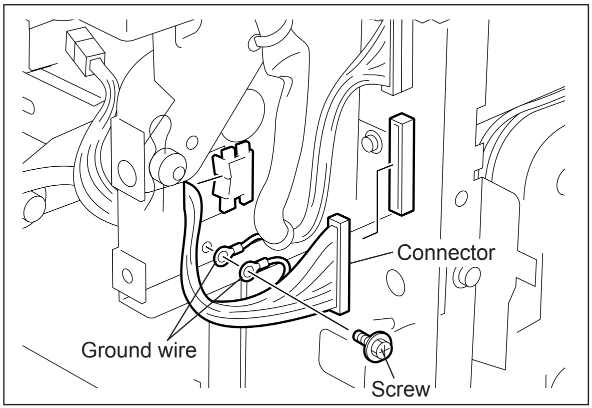

Connector
Ground wire
Screw

Fig. 9-404

(7) Open the side cover.

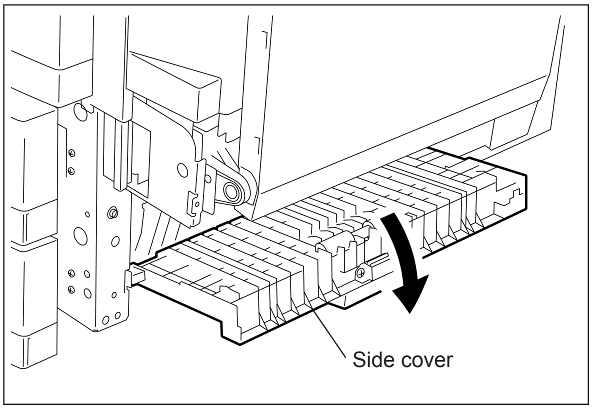


Fig. 9-405

(8) Remove 2 screws, lift the bypass unit up, remove 2 hooks and pull it out to the front.

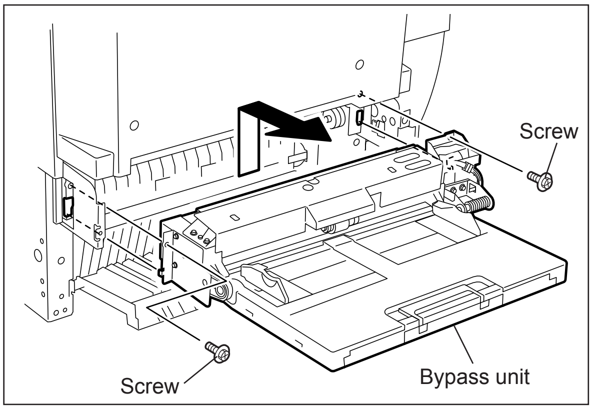


Fig. 9-406

(A-2) Hinge assembly

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).

(2) Disconnect 1 connector and release the harness from harness clamp.

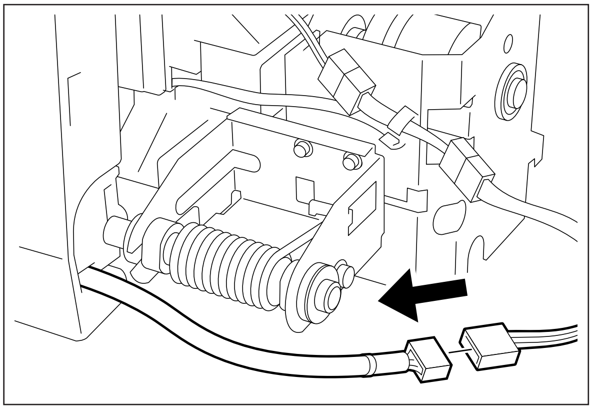


Fig. 9-407

(3) Remove 2 screws and slide the hinge assembly to take it off with the tray. (Standing the tray makes easier to be removed.)

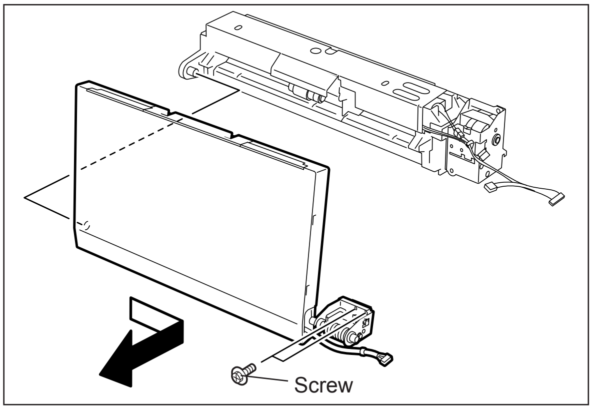


Fig. 9-408

(4) Pull out the hinge assembly from the bypass tray.

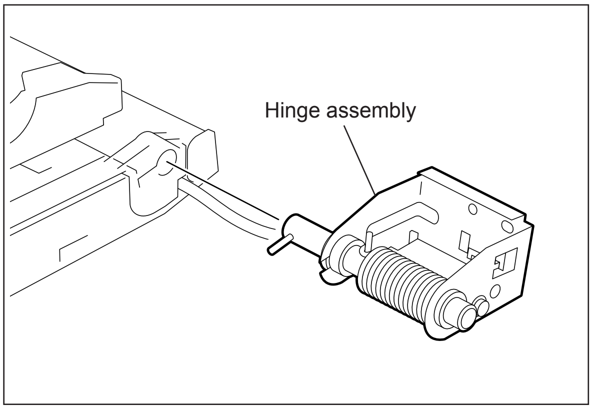

Hinge assembly

Fig. 9-409

(A-3) SFB board

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).

(2) Take off the hinge assembly (► Chapter 9.4 (A-2)).

(3) Remove 3 screws, 4 latches and 3 hooks, and take off bypass tray upper cover.

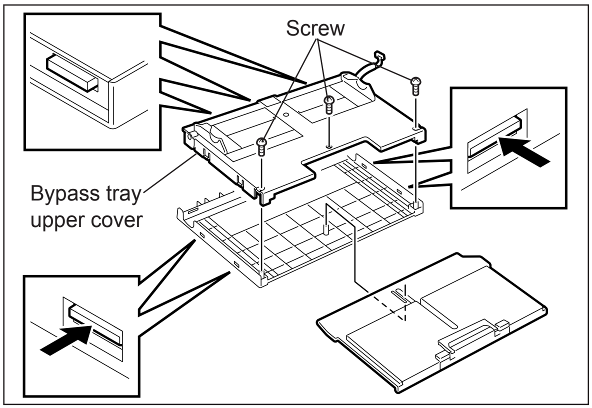

Screw
Bypass tray upper cover

Fig. 9-410

(4) Remove 1 screw and take off the plate spring.

(5) Remove 1 screw on the tray side and take off the bracket.

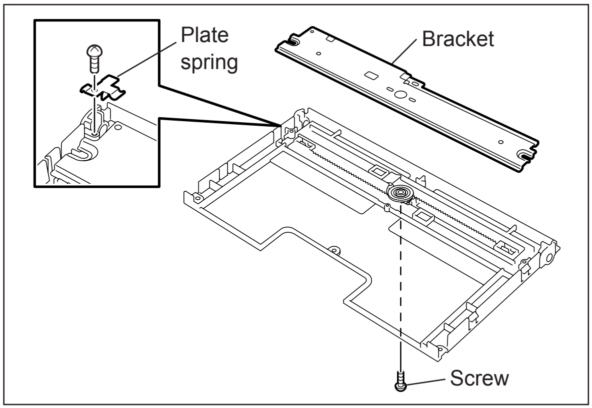


Plate spring
Bracket
Screw

Fig. 9-411

Note:

Install the bracket so that its pointer is placed at the same position as before.

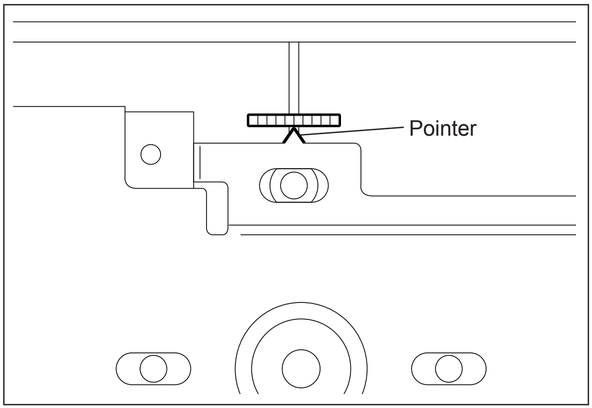


Fig. 9-412

(6) Disconnect 1 connector, remove 1 screw and take off the SFB board.

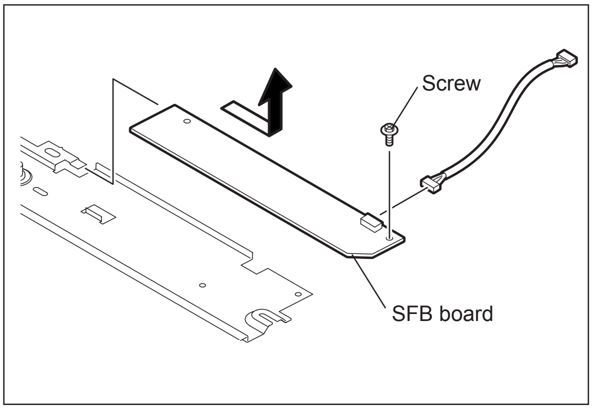

Screw
SFB board

Fig. 9-413

(A-4) Bypass pickup solenoid

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).

(2) Remove 1 screw and slide the bypass feed upper cover to take it off.

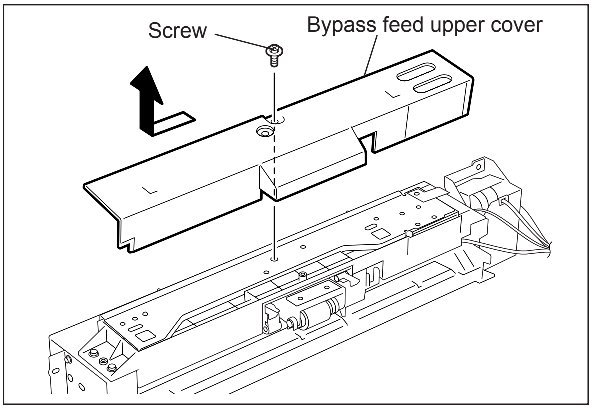

Screw
Bypass feed upper cover

Fig. 9-414

(3) Remove 4 screws and take off the upper plate.

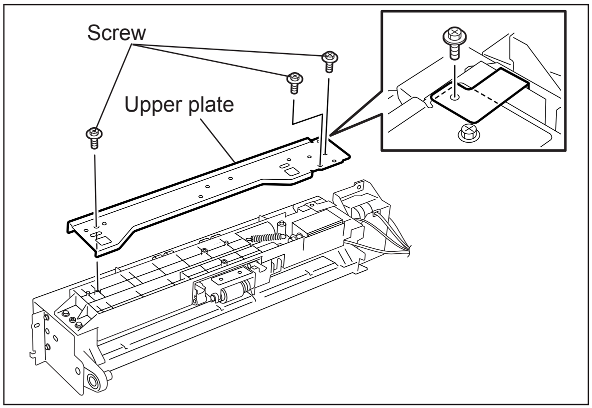

Screw
Upper plate

Fig. 9-415

(4) Disconnect 1 connector, remove 1 spring and take off the bypass pickup solenoid with the solenoid arm.

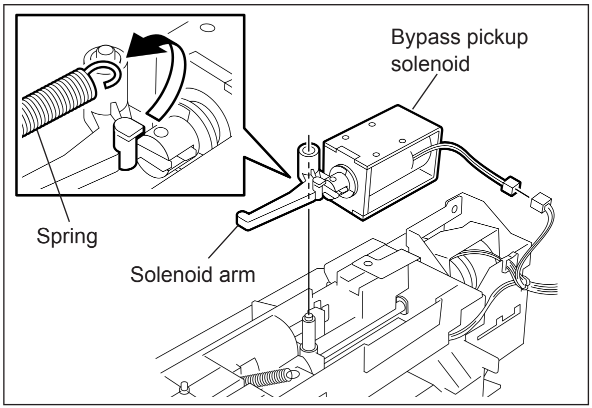

Bypass pickup solenoid
Spring
Solenoid arm

Fig. 9-416

(A-5) Bypass paper sensor

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).

(2) Take off the bypass feed upper cover (► Chapter 9.4 (A-4)).

(3) Take off the upper plate (► Chapter 9.4 (A-4)).

(4) Take off the spring and sensor arm.

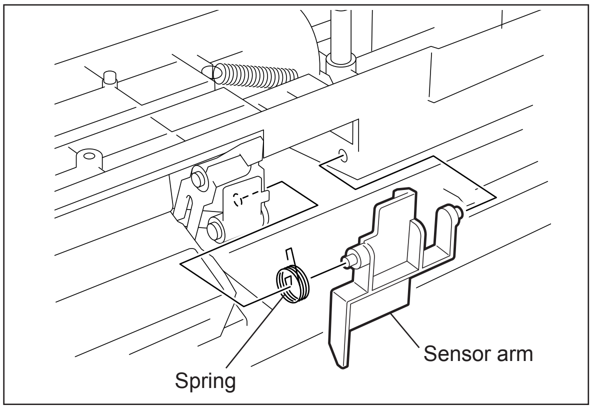

Sensor arm
Spring

Fig. 9-417

(5) Disconnect the connector from the sensor and release the latch to take off the bypass paper sensor.

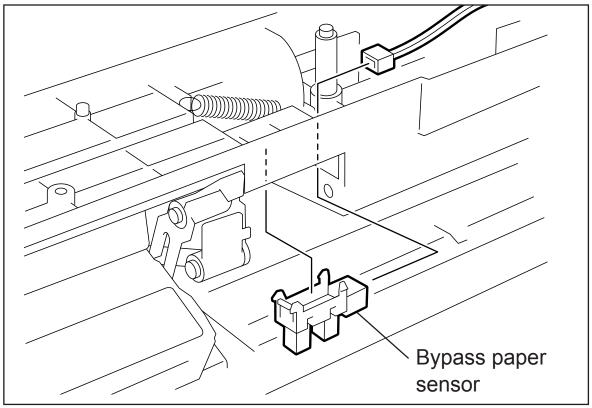

Bypass paper sensor

Fig. 9-418

(A-6) Bypass pickup roller

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).

(2) Remove 1 screw and take off the bypass feed upper cover .

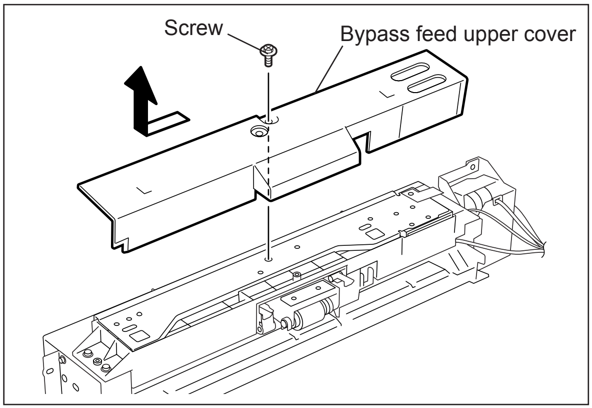

Screw
Bypass feed upper cover

Fig. 9-419

(3) Remove 4 screws and take off the bypass drive unit.

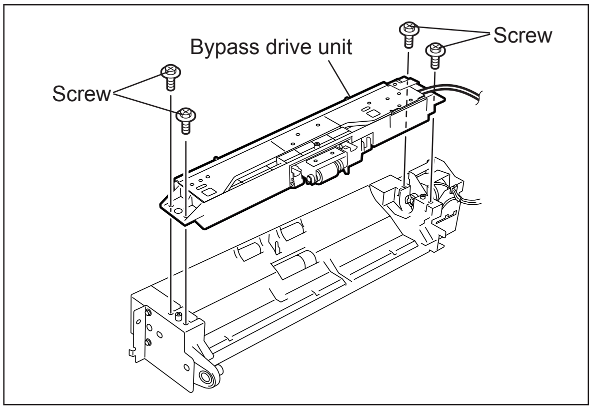

Screw
Bypass drive unit
Screw

Fig. 9-420

(4) Remove the clip, pull out the shaft and take off the bypass pickup roller.

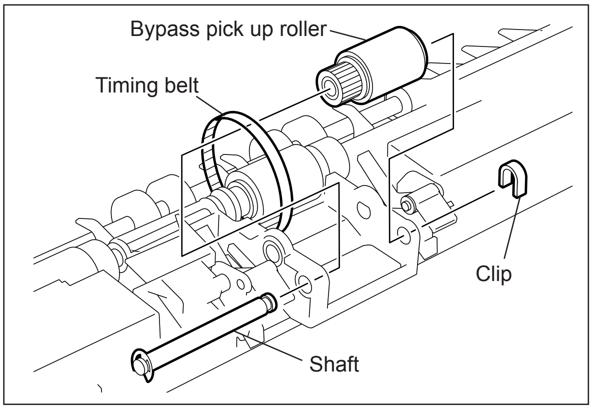


Fig. 9-421

(A-7) Bypass feed roller

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).

(2) Take off the bypass feed upper cover (► Chapter 9.4 (A-6)).

(3) Take off the bypass drive unit (► Chapter 9.4 (A-6)).

(4) Remove the clip, pull out the shaft and take off the bypass feed roller.

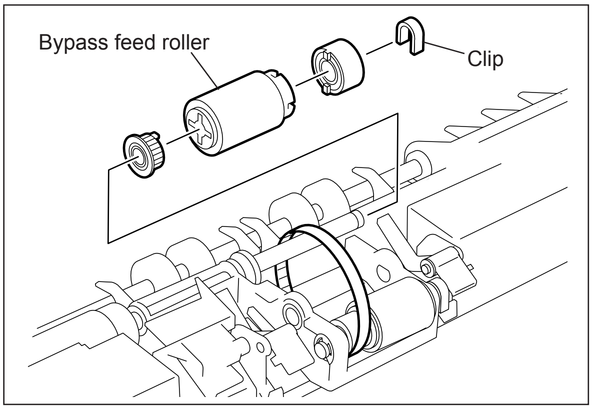


Fig. 9-422

Note:

Make sure the following items when assembling the bypass feed roller and bypass pickup roller.

1. Set the timing belt to the pulley securely.
2. Do not put the wrong position when setting the timing belt.
3. Be sure to insert the clip into the groove of shaft.
4. Check that there is no stain such as oil on the surface of timing belt, the pulley and the roller.
5. Install the bypass pickup roller and the bypass feed roller in the correct direction.

(A-8) Bypass transport roller

(1) Take off the bypass feed upper cover (► Chapter 9.4 (A-6)).

(2) Take off the bypass drive unit (► Chapter 9.4 (A-6)).

(3) Remove the E-ring, pull out the shaft and take off the bypass transport roller.

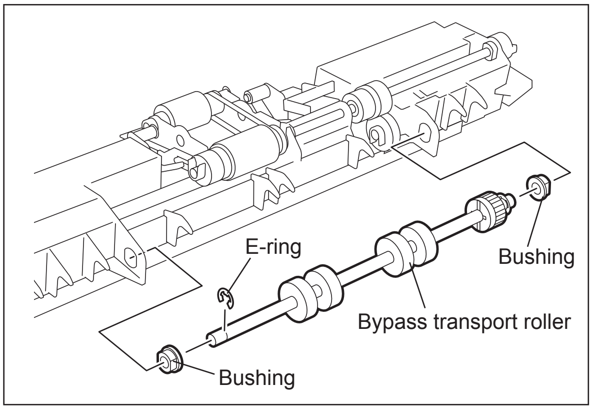


Fig. 9-423

(A-9) Bypass feed clutch

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).

(2) Take off the bypass tray and hinge assembly (► Chapter 9.4 (A-2)).

(3) Disconnect 1 connector and release the harness from harness clamp.

(4) Remove the harness clamp.

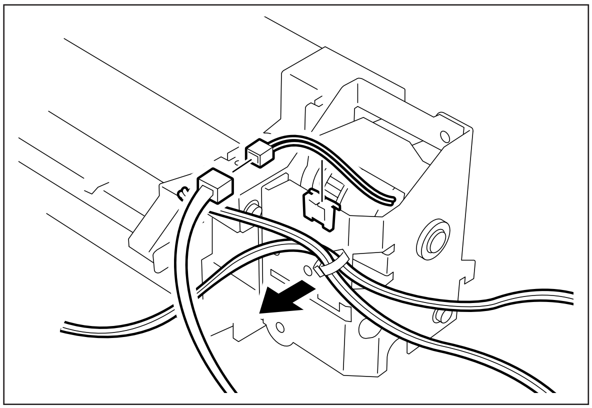


Fig. 9-424

(5) Remove 3 screws and take off the drive unit.

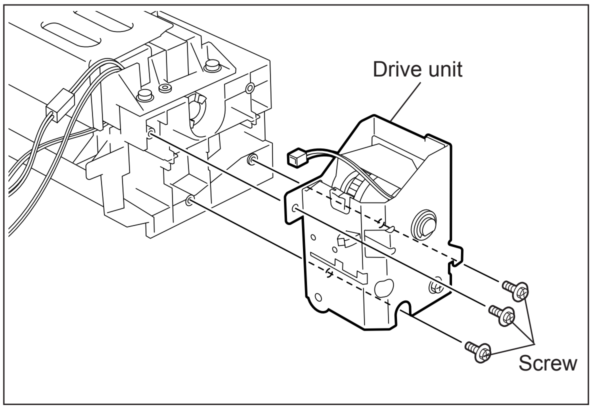


Fig. 9-425

(6) Remove the E-ring and the bush, and then pull out the shaft.

(7) Remove 3 screws and take off the bracket.

(8) Remove the gear and the bypass feed clutch.

Note:

Match the protruding portion of the clutch with the position shown in the drawing for assembling.

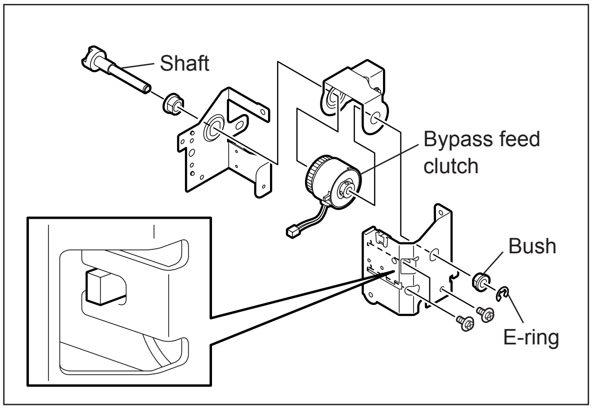


Fig. 9-426

(A-10) Bypass separation roller

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).

(2) Remove 3 screws and take off the lower plate.

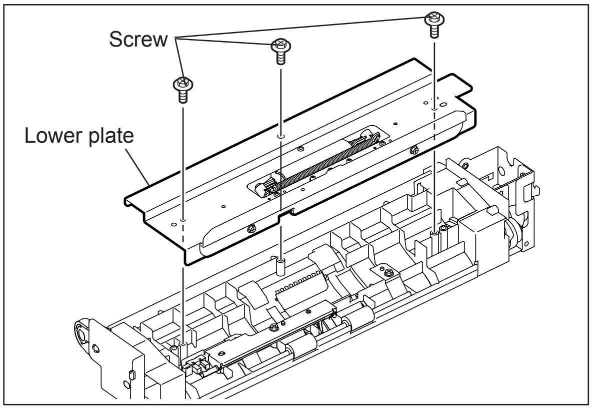


Fig. 9-427

(3) Take off the bypass separation roller assembly.

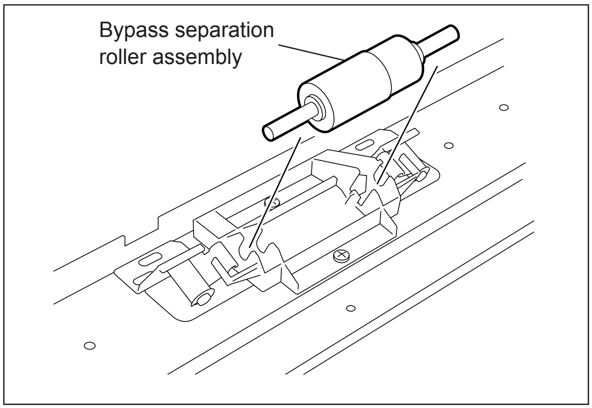

Bypass separation roller assembly

Fig. 9-428

(4) Detach the cover, the arbor, and the clutch spring from the shaft, and then take off the bypass separation roller.

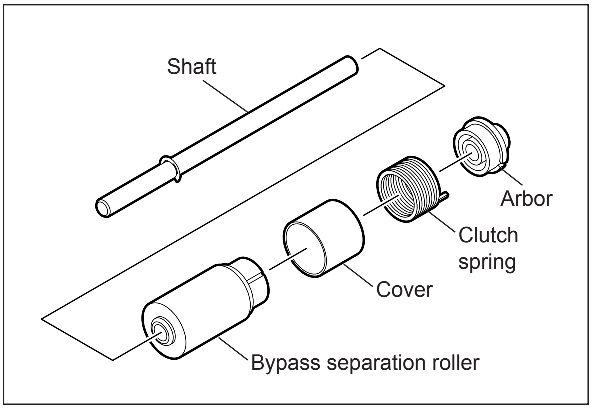

Shaft
Arbor
Clutch spring
Cover
Bypass separation roller

Fig. 9-429

(A-11) Bypass feed sensor

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).

(2) Take off the lower plate (► Chapter 9.4 (A-10)).

(3) Remove 1 screw and take off the sensor plate.

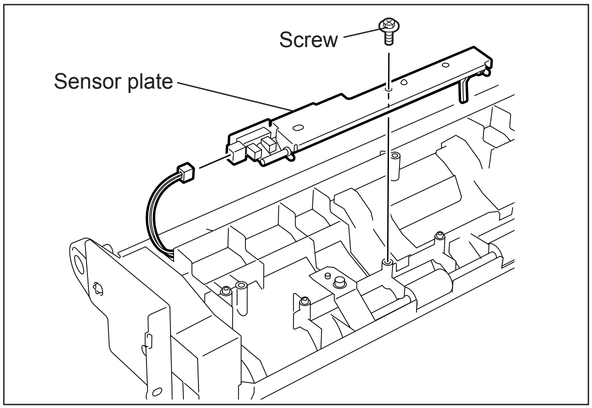

Screw
Sensor plate

Fig. 9-430

(4) Disconnect 1 connector, release the latch to take off the bypass feed sensor.

Note:

Be careful not to come off the sensor arm and the sensor spring after taking off the sensor.

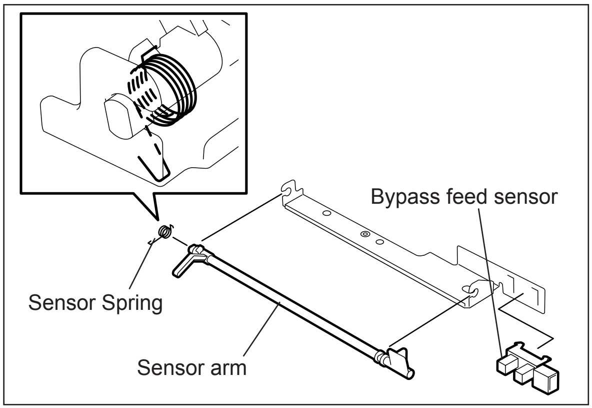

Bypass feed sensor
Sensor Spring
Sensor arm

Fig. 9-431

[B] Lower drawer feed sensor

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).

(2) Take off the ADU (► Chapter 14.5 [A]).

(3) Remove the upper and lower drawers.

(4) Take off the front cover (► Chapter 2.5.1 [A]).

(5) Take off the front right cover (► Chapter 2.5.1 [B]).

(6) Take off the cleaner unit (► Chapter 11.6 [A]).

(7) Open the jam access cover.

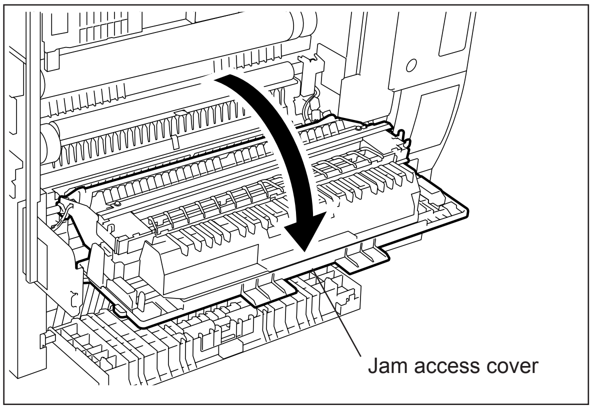


Fig. 9-432

(8) Release the latch and take off the transfer/separation charger.

Note:

Be sure that the spring is inserted in 2 terminals when assembling.

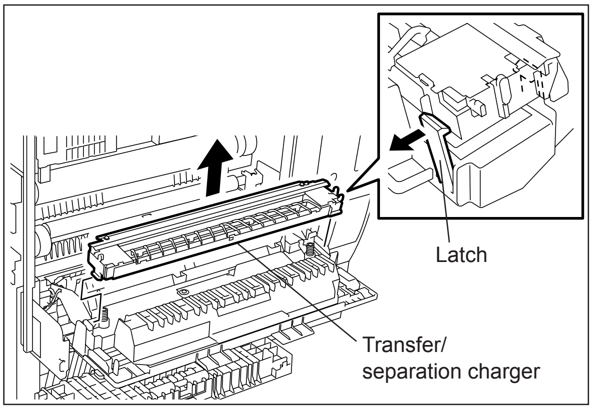


Fig. 9-433

(9) Disconnect 3 connectors.

Note:

Hook the harness on the hook securely when inserting the connector of the transfer/separation charger.

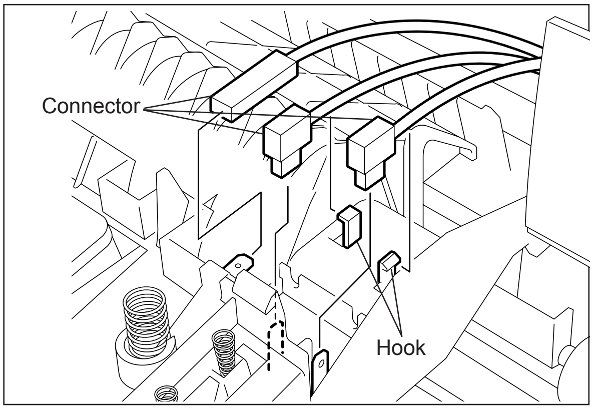


Fig. 9-434

(10) Disconnect the connector on the front side.

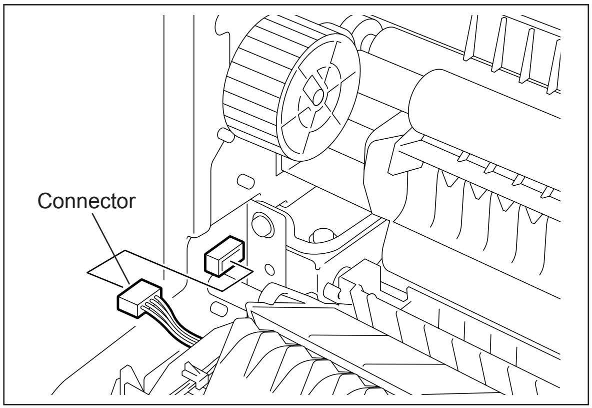


Fig. 9-435

(11) Take off the jam access cover.

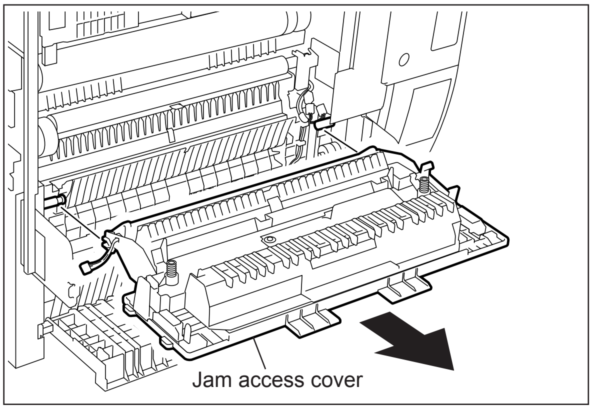

Jam access cover

Fig. 9-436

(12) Disconnect the connector and remove the harness.

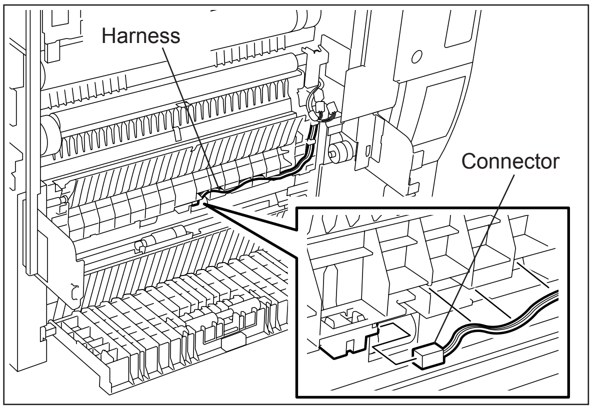

Harness
Connector

Fig. 9-437

(13) Remove 2 screws and take off the right transport guide.

Note:

When taking off the right transport guide, be careful not to come off the bypass transport guide and the spring together with it.

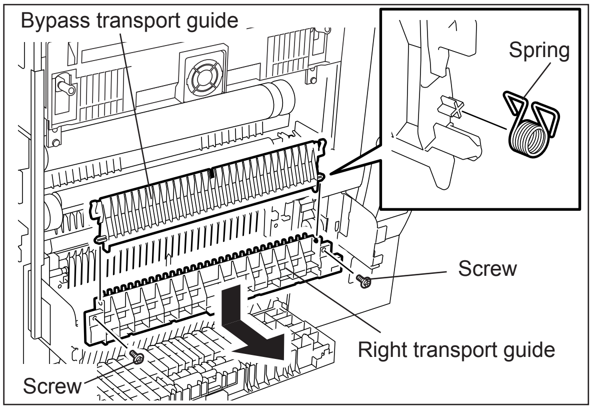

Bypass transport guide
Spring
Screw
Right transport guide
Screw

Fig. 9-438

(14) Release the latch and take off the lower drawer feed sensor.

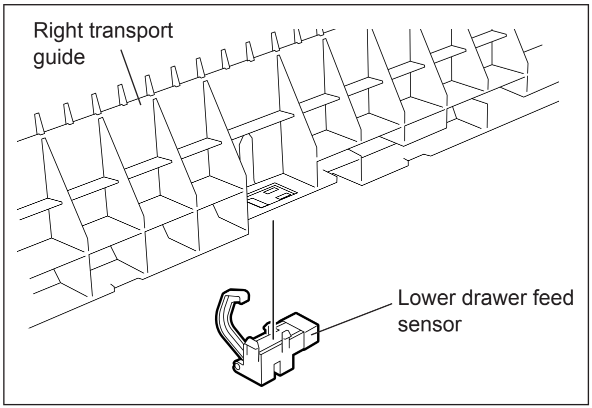

Right transport guide
Lower drawer feed sensor

Fig. 9-439

[C] Registration sensor, Upper drawer feed sensor

(1) Take off the front cover (► Chapter 2.5.1 [A]).

(2) Take off the front right cover (► Chapter 2.5.1 [B]).

(3) Take off the right upper cover (► Chapter 2.5.1 [O]).

(4) Take off the cleaner unit (► Chapter 11.6 [A]).

(5) Take off the IH terminal cover (► Chapter 2.5.1 [F]).

(6) Take off the right rear cover (► Chapter 2.5.1 [G]).

(7) Remove 1 screw and take off the front cover stay.

(8) Release the latch from the shaft and take off the jam release knob.

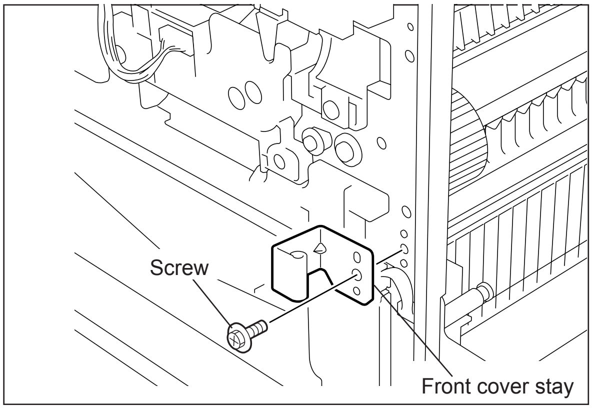


Fig. 9-440

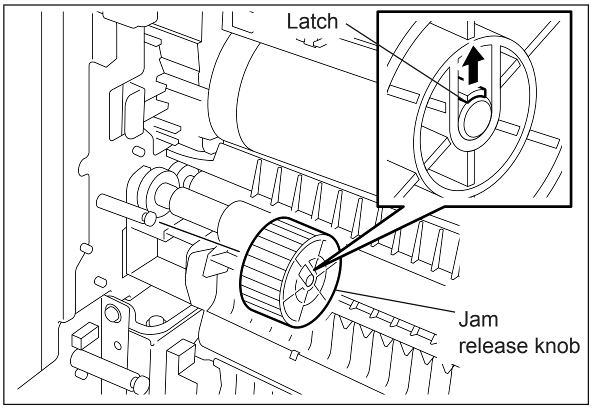


Fig. 9-441

(9) Remove 1 screw and take off the terminal cover.

(10) Remove 1 screw and disconnect the red lead wire from the terminal cover.

Note:

Make sure that the harness is inserted into the dent of the terminal cover when installing.

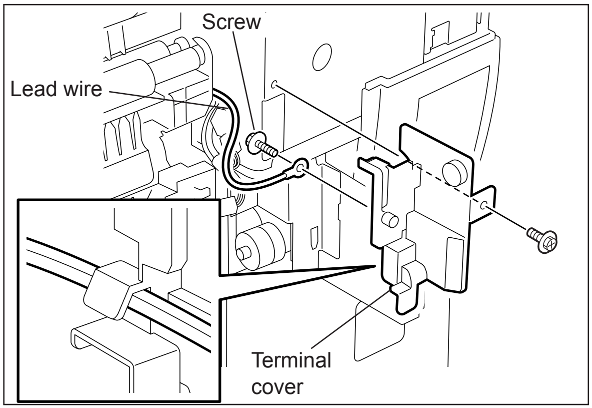


Fig. 9-442

(11) Disconnect 2 connectors.

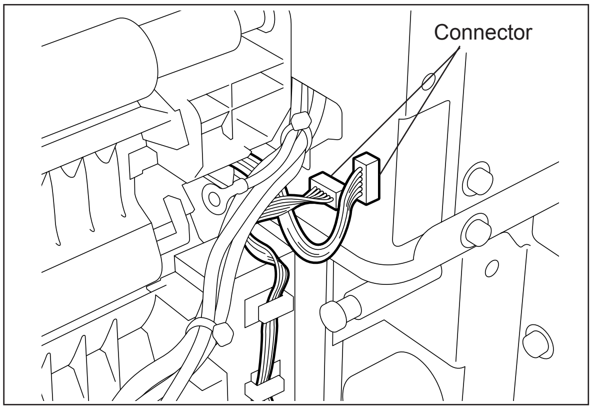


Fig. 9-443

(12) Remove 3 screws and take off the left transport guide.

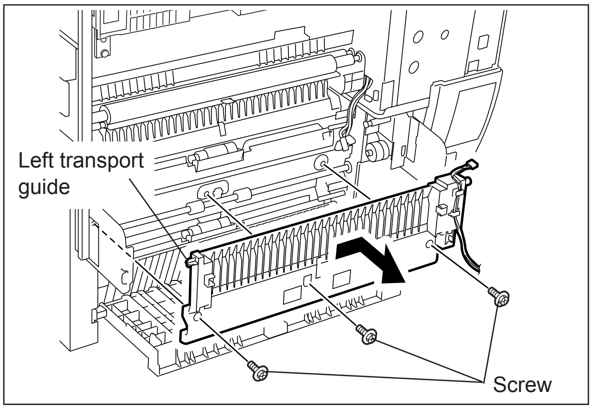

Left transport guide
Screw

Fig. 9-444

(13) Remove 2 screws and take off the registration front guide.

Note:

Be careful not to deform or damage the roller supporting section when installing or taking off the registration front guide.

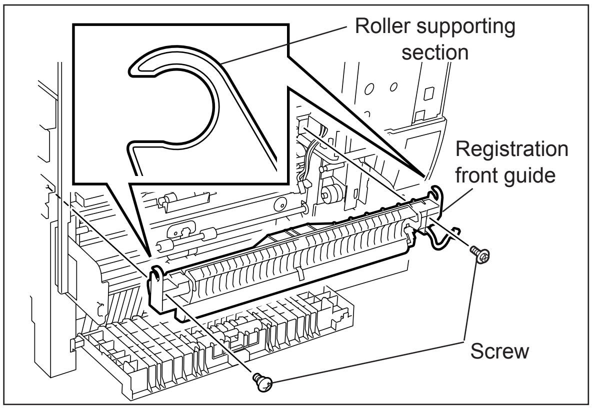

Roller supporting section
Registration front guide
Screw

Fig. 9-445

(14) Remove 1 screw and take off the registration sensor with bracket.

(15) Disconnect the connector, release the latch to take off the registration sensor.

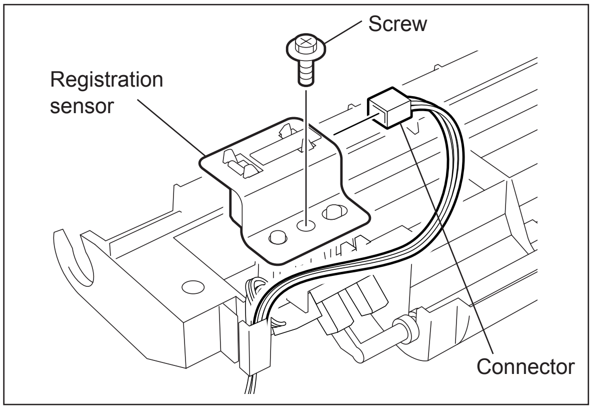

Screw
Registration sensor
Connector

Fig. 9-446

(16) Disconnect the connector, take off the upper drawer feed sensor.

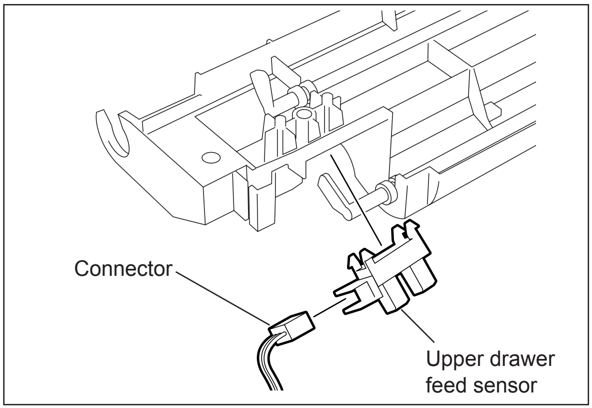

Connector
Upper drawer feed sensor

Fig. 9-447

[D] Registration roller

(1) Take off the bypass unit (► Chapter 9.4 (A-1)).
(2) Take off ADU (► Chapter 14.5 [A]).
(3) Take off the front cover (► Chapter 2.5.1 [A]).
(4) Take off the cleaner unit (► Chapter 11.6 [A]).
(5) Take off the rear cover (► Chapter 2.5.1 [H]).
(6) Take off the right rear cover (► Chapter 2.5.1 [G]).
(7) Take off the SYS board cover (► Chapter 2.5.2 [C]).
(8) Take off the developer cooling fan-2 (► Chapter 11.6 [I]).
(9) Disconnect 1 connector of the registration clutch.
(10) Loosen 1 setscrew and take off the registration clutch.

Note:

Match the protruding portion of the clutch with the position shown in the drawing for assembling.

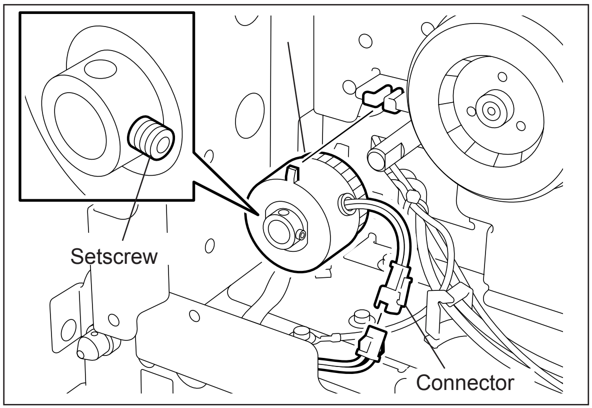


Fig. 9-448

(11) Disconnect 1 connector of the fan motor.
(12) Remove 1 screw and take off the developer unit cooling fan-1 unit.

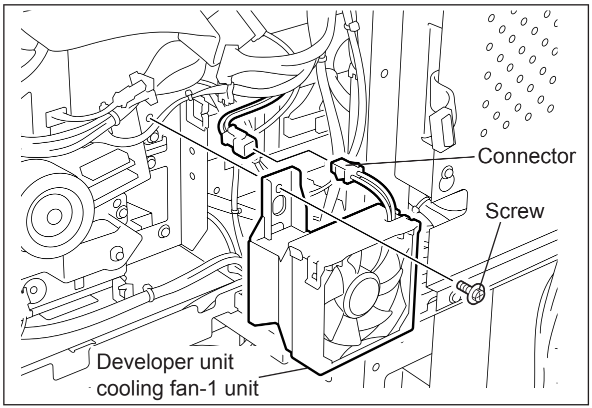


Fig. 9-449

(13) Disconnect 3 connectors of the drive gear unit.

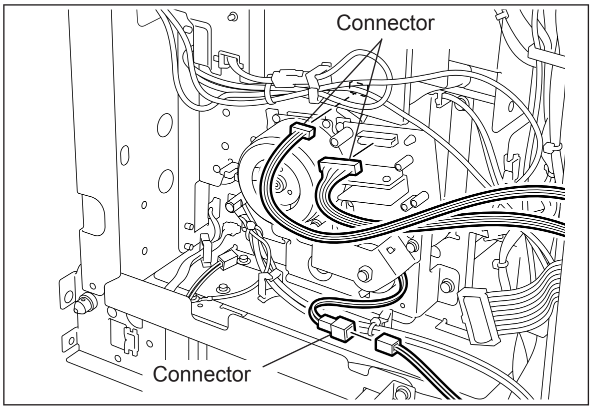

Connector
Connector

Fig. 9-450

(14) Disconnect 2 connectors wired from the drive gear unit.

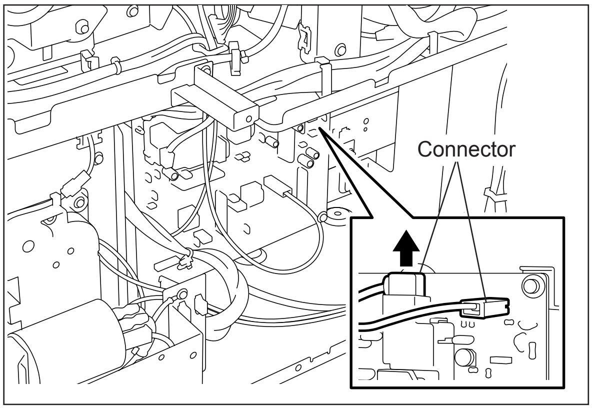


Fig. 9-451

(15) Remove 5 screws and take off the drive gear unit.

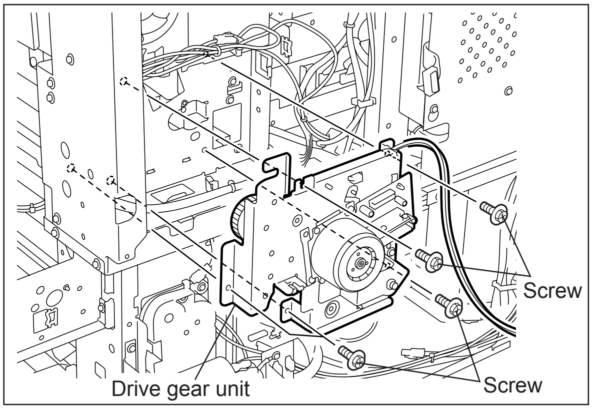

Screw
Drive gear unit
Screw

Fig. 9-452

(16) Remove the E-ring and the bushing of the registration roller (1 pc. each).

(17) Remove the E-ring and the bushing on the front side and slide the registration roller (rubber) to the rear side to take it off.

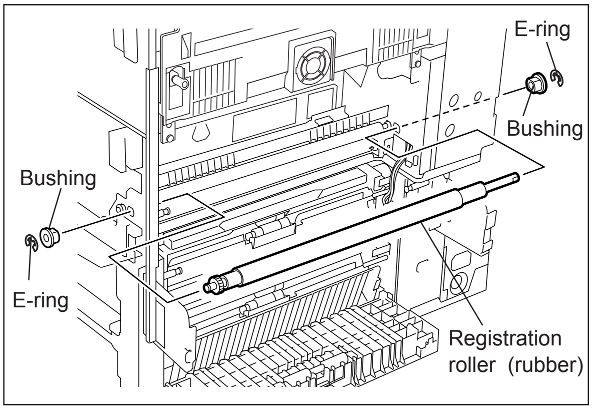

E-ring
Bushing
Bushing
E-ring
Registration roller (rubber)

Fig. 9-453

(18) Take off the registration roller (metal).
(front side: 1 E-ring, 1 bushing and 1 spring, rear side: 1 E-ring, 1 bushing and 1 spring)

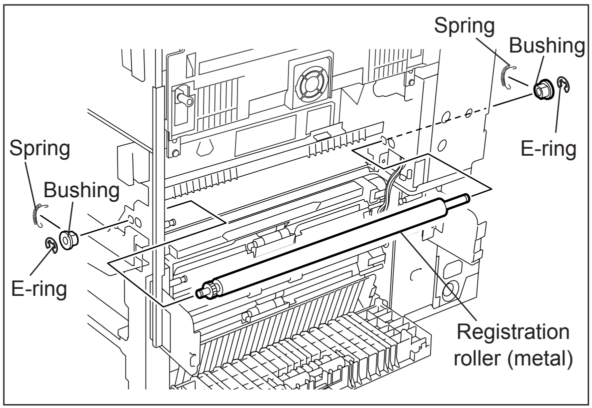

Spring
Bushing
E-ring
Spring
Bushing
E-ring
Registration roller (metal)

Fig. 9-454

[E] Tray drive unit/Tray-up motor

(1) Remove the upper and lower drawers.
(2) Take off the rear cover (► Chapter 2.5.1 [H]).
(3) Take off the right rear hinge cover (► Chapter 2.5.1 [D]).
(4) Remove 4 screws and take off the right lower cover (► Chapter 2.5.1 [E]).
(5) Remove 4 screws and take off the noise filter assembly.

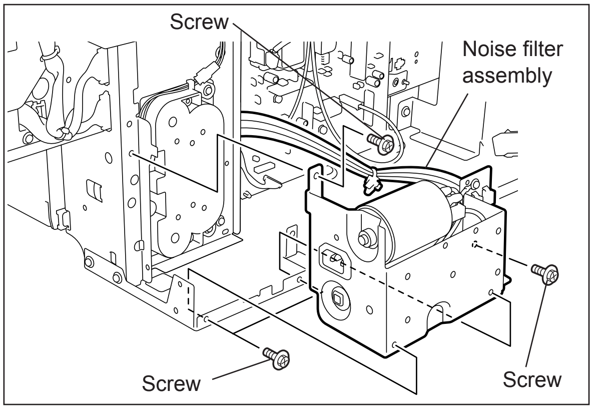

Screw
Noise filter assembly
Screw
Screw

Fig. 9-455

(6) Disconnect 1 connector of the tray drive unit and release the harness from the harness clamp.
(7) Remove 5 screws and take off the tray drive unit with the plate.

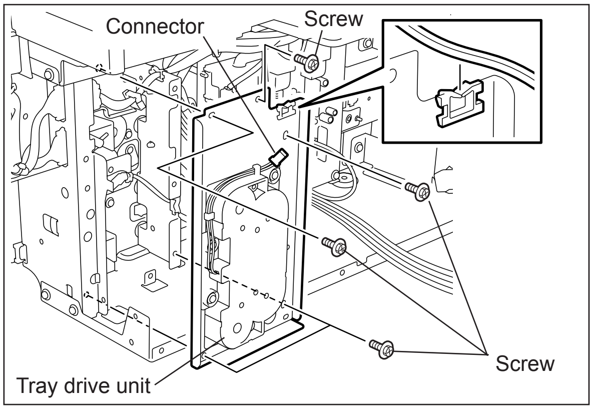

Connector
Screw
Screw
Tray drive unit

Fig. 9-456

(8) Remove 4 screws and detach the tray drive unit from the plate.

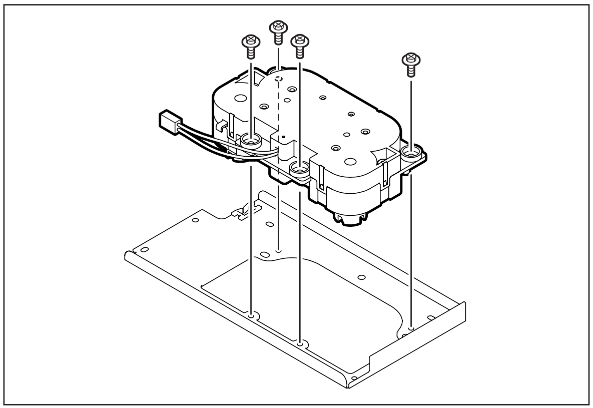


Fig. 9-457

(9) Place the unit with its coupling up and release 6 latches to take off the cover.

Note:

Be careful in taking off the cover because there is a spring in the tray drive unit.

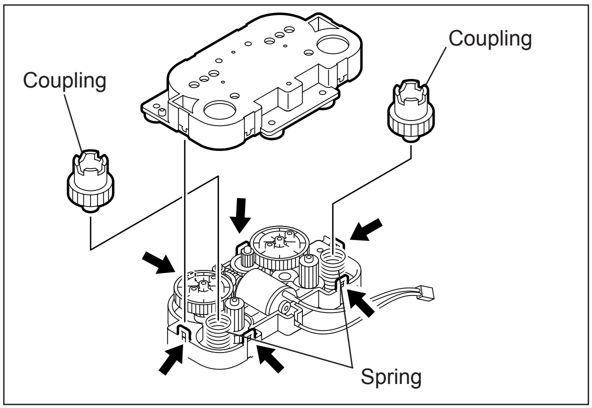


Fig. 9-458

(10) Take off the tray-up motor.

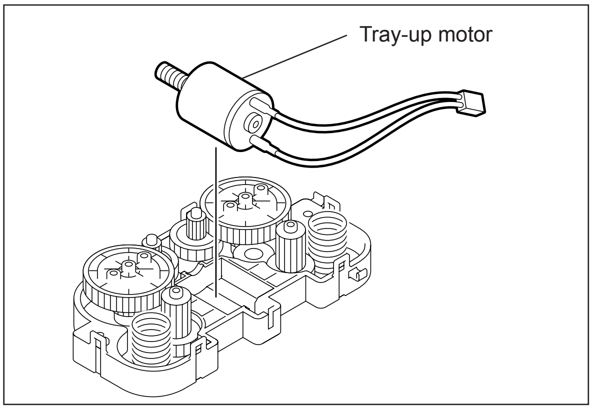


Fig. 9-459

Note:

Match the boss of the gear with the hole of the cover when installing the motor.

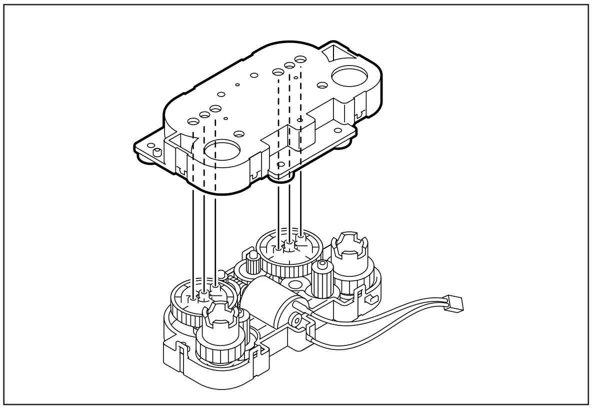


Fig. 9-460

[F] Transport clutch (upper/lower)

(1) Take off the rear cover (► Chapter 2.5 1 [H]).

(2) Take off the tray drive unit with its plate (► Chapter 9.4 [E]).

(3) Remove 3 screws, 1 E-ring and take off the clutch bracket.

Note:

Do not apply pressure the transport clutch in all directions when installing the clutch bracket.

After installing it, open the side cover and check that the transport roller rotates smoothly.

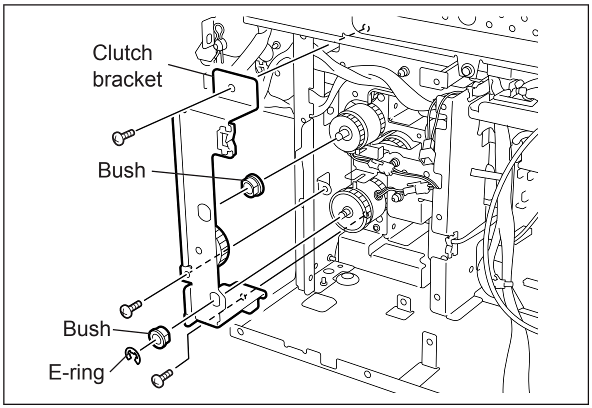

Clutch bracket
Bush
Bush
E-ring

Fig. 9-461

(4) Remove 2 gears and disconnect 2 connectors.

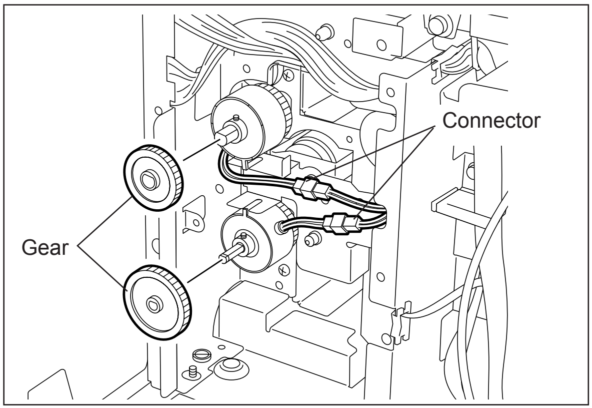

Connector
Gear

Fig. 9-462

(5) Take off the upper and lower transport clutch. (Remove the gear and disconnect the connector respectively, and then loosen the setscrew to take them off.)

Notes:

1. Make sure that the upper and lower clutch are different in size when installing them.
   Upper side: Shaft diameter, 8 mm
   Lower side: Shaft diameter, 6 mm

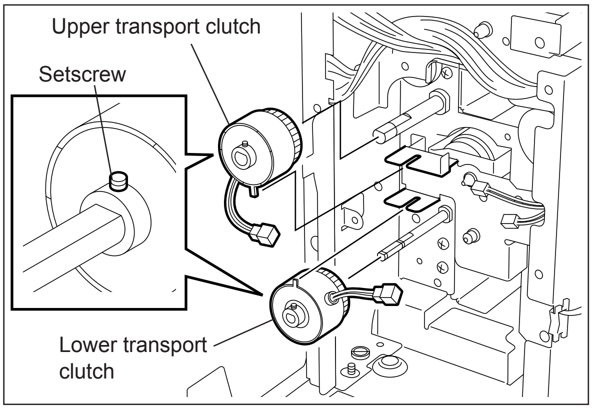

Upper transport clutch
Setscrew
Lower transport clutch

Fig. 9-463

2. Attach the clutches to the shafts as shown on the right.

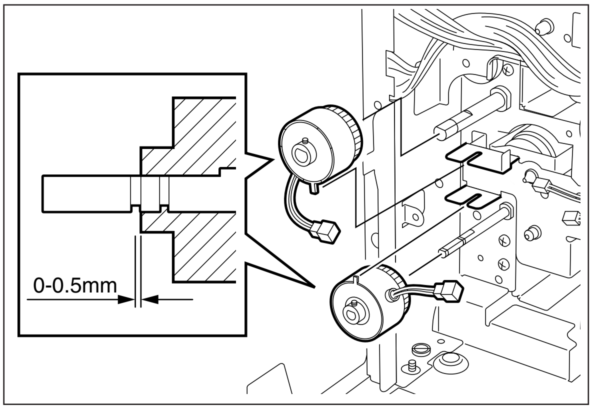


Fig. 9-464

[G] Drawer detection switch (upper/lower)

(1) Remove the upper and lower drawers.

(2) Take off the rear cover (► Chapter 2.5.1 [H]).

(3) Take off the noise filter assembly (4 screws).

(4) Take off the tray drive unit with its plate (► Chapter 9.4 [E]).

(5) Disconnect the connector, release the latch and take off the drawer detection switch from the front side.

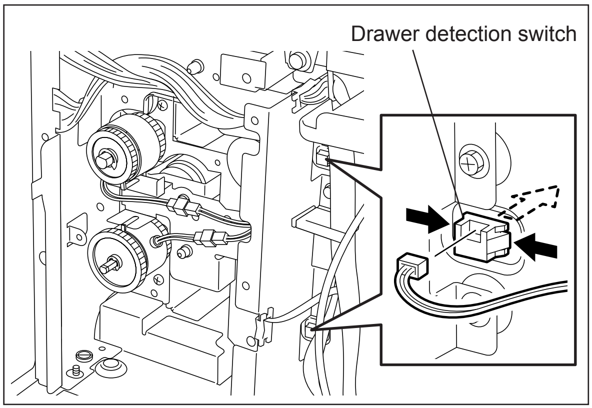


Fig. 9-465

[H] Drawer feeding unit (upper/lower)

(H-1) Drawer feeding unit

(1) Take off the upper and lower drawers.

(2) Remove 1 screw and take off the drawer feeding unit by sliding it to the front side.

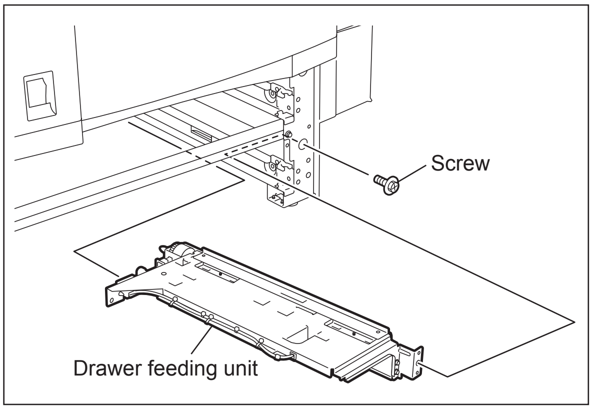


Fig. 9-466

(H-2) Tray-up sensor

(1) Take off the drawer feeding unit (► Chapter 10.4 (H-1)).

(2) Disconnect the connector and release the latch to take off the tray-up sensor.

(H-3) Empty sensor

(1) Take off the drawer feeding unit (► Chapter 10.4 (H-1)).

(2) Disconnect the connector and release the latch to take off the empty sensor.

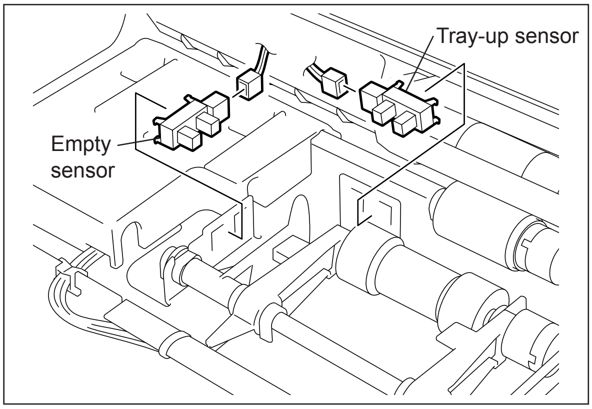


Fig. 9-467

(H-4) Paper stock sensor

(1) Take off the drawer feeding unit (► Chapter 10.4 (H-1)).

(2) Pull up the paper stock sensor arm.

(3) Disconnect the connector and release the latch to take off the paper stock sensor.

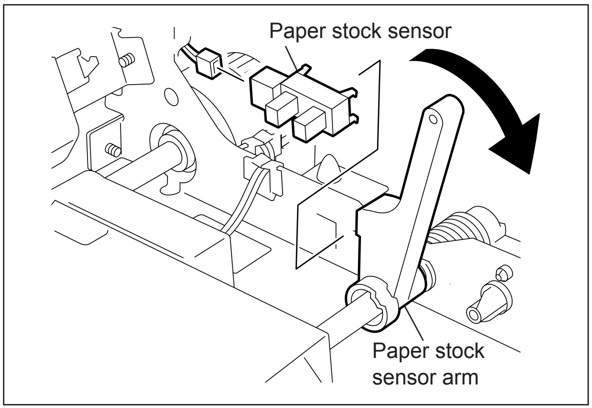

Paper stock sensor
Paper stock sensor arm

Fig. 9-468

(H-5) Separation roller

(1) Take off the drawer feeding unit (► Chapter 10.4 (H-1)).

(2) Remove 1 screw and take off the separation roller holder.

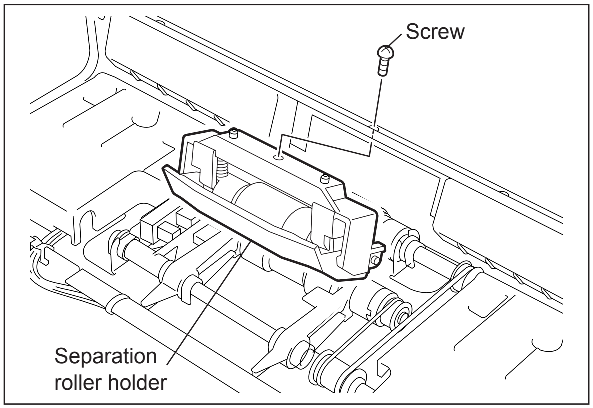

Screw
Separation roller holder

Fig. 9-469

(3) Detach the lever from the holder and take off the separation roller with the shaft.

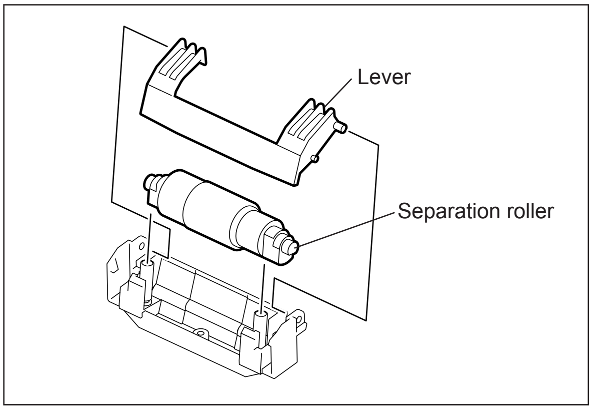

Lever
Separation roller

Fig. 9-470

(4) Detach the cover, the arbor, the clutch spring and the washer from the shaft, and then take off the separation roller.

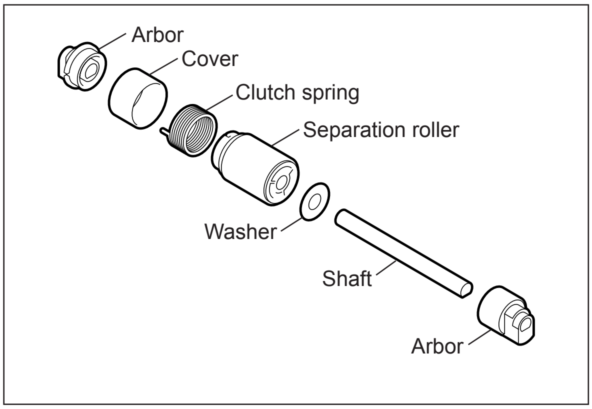

Arbor
Cover
Clutch spring
Separation roller
Washer
Shaft
Arbor

Fig. 9-471

(H-6) Feed roller

(1) Take off the drawer feeding unit (► Chapter 10.4 (H-1)).

(2) Take off the separation roller (► Chapter 10.4 (H-5)).

(3) Remove the clip and take off the feed roller.

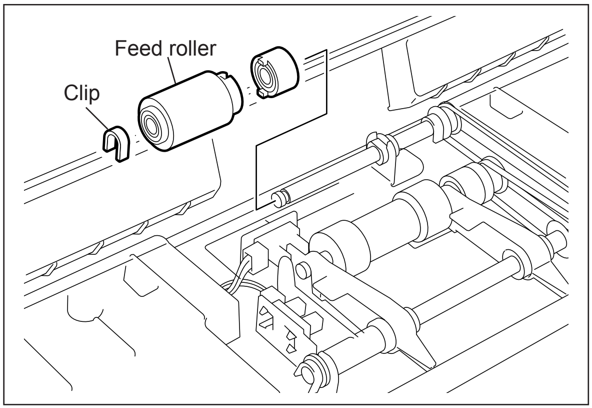

Feed roller
Clip

Fig. 9-472

(H-7) Pickup roller

(1) Take off the drawer feeding unit (► Chapter 10.4 (H-1)).

(2) Remove the pickup roller assembly from the pickup arms and take off the belt.

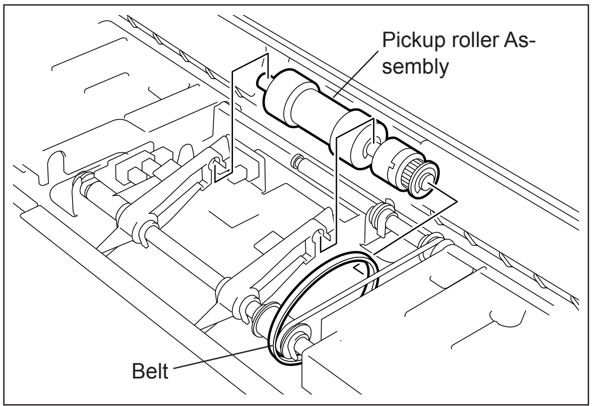

Pickup roller Assembly
Belt

Fig. 9-473

(3) Remove 3 E-rings, pulley, one-way clutch and take off the pickup roller.

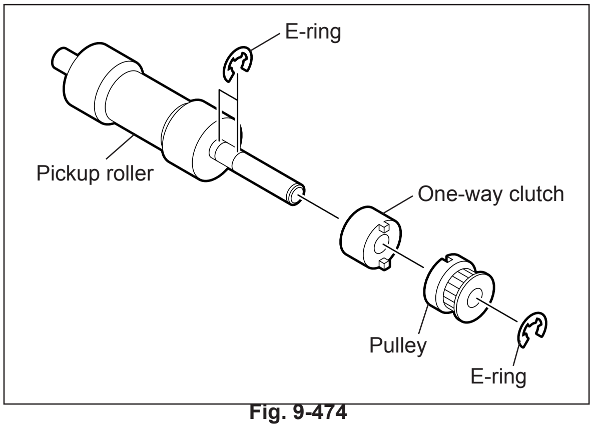

E-ring
Pickup roller
One-way clutch
Pulley
E-ring

Fig. 9-474

(H-8) Drawer feed clutch

(1) Take off the drawer feeding unit (► Chapter 10.4 (H-1)).

(2) Disconnect the connector and release the harness from harness clamp.

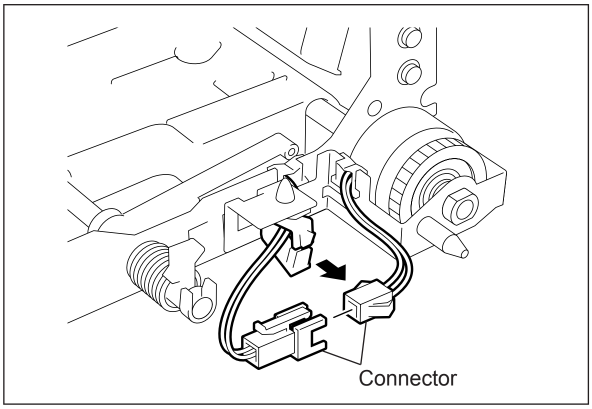


Fig. 9-475

(3) Remove 2 screws and take off the clutch bracket and bush.

Notes:

Match the protruding portion of clutch with the position shown in the drawing for assembling.

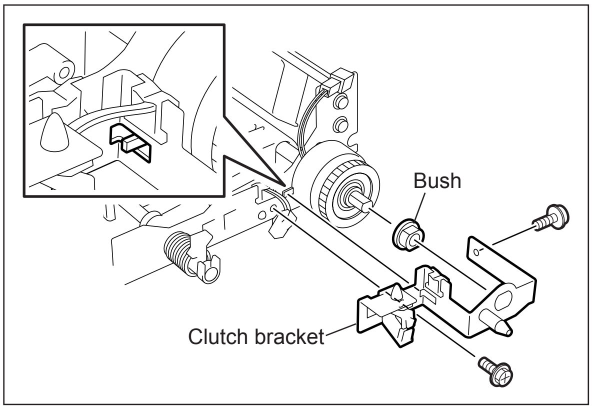

Bush
Clutch bracket

Fig. 9-476

(4) Loosen 1 setscrew and take off the drawer feed clutch.

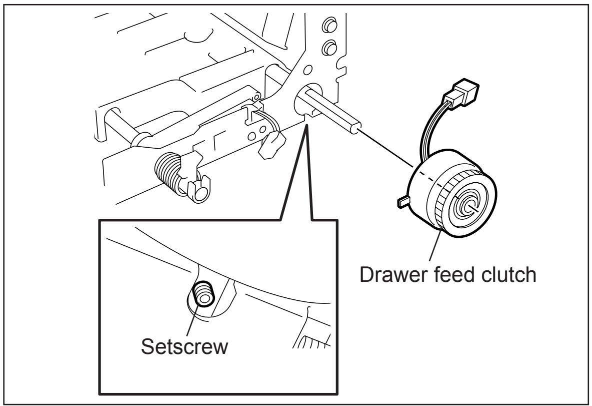

Drawer feed clutch
Setscrew

Fig. 9-477

Notes:

Attach the clutch to the shaft referring to the figure at right.

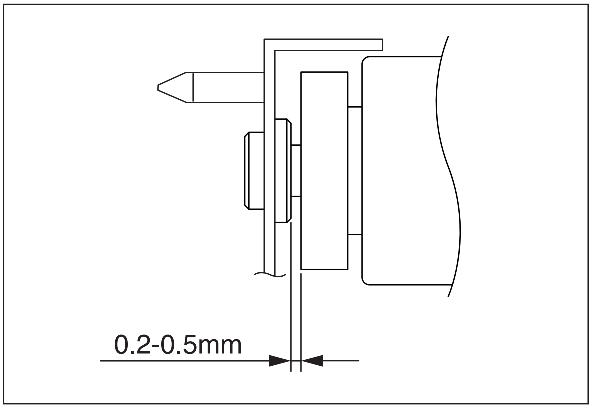


Fig. 9-478

10. DRIVE SYSTEM

10.1 General Description

The drive system drives the drum, developer unit, cleaner unit, fuser unit, transport roller, feed roller (upper/lower drawer and bypass unit) and registration roller.

The drive system is driven by the rotation of the main motor.

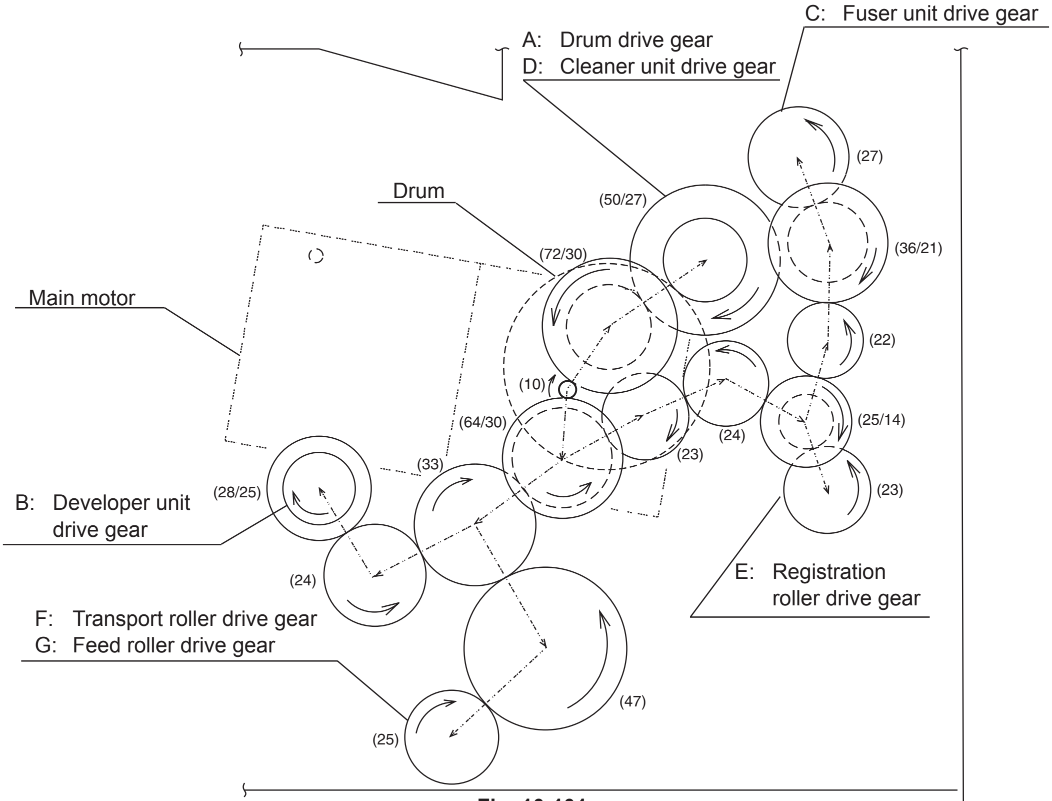

C: Fuser unit drive gear
A: Drum drive gear
D: Cleaner unit drive gear
(27)
Drum
(50/27)
(36/21)
(72/30)
Main motor
(22)
(10)
(64/30)
(24)
(25/14)
(23)
(33)
B: Developer unit drive gear
(28/25)
(23)
E: Registration roller drive gear
(24)
F: Transport roller drive gear
G: Feed roller drive gear
(47)
(25)

Fig. 10-101

10.2 Functions

A: Drum drive.........................Drives the drum by transmitting the rotation of the main motor through the gears to the drum flange gear.

B: Developer unit drive ....Drives the developer unit by transmitting the rotation of the main motor through the gears and clutch to the developer unit gears.

C: Fuser unit drive..................Drives the fuser unit by transmitting the rotation of the main motor through the gears to the fuser unit gears.

D: Cleaner unit drive ....Drives the cleaner unit gear by the rotation of the drum flange gear.

E: Registration roller drive .....Drives the registration rollers by transmitting the rotation of the main motor through the gears and clutches.

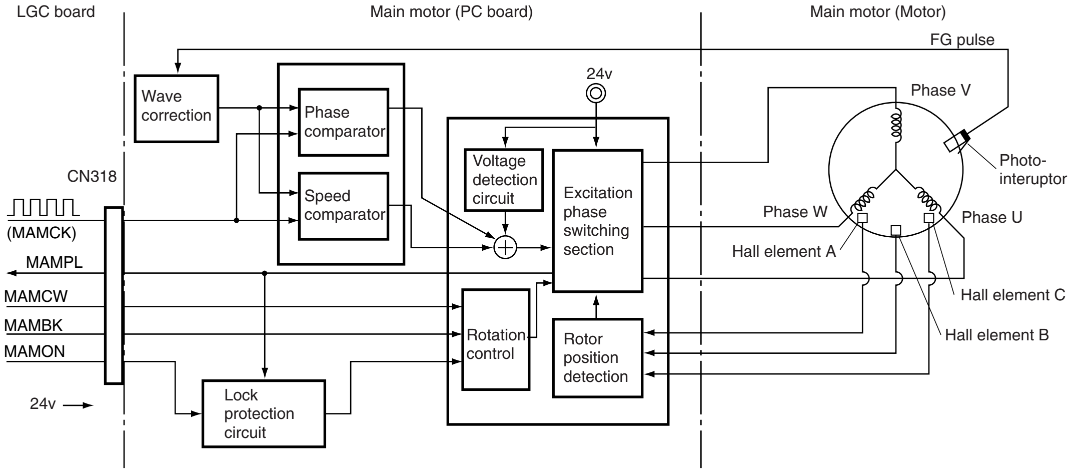
F: Transport roller drive ....Drives the transport roller by transmitting the rotation of the main motor through the gears and clutches.

G: Feed roller drive ....Drives the drawer feed roller by transmitting the rotation of the main motor through the gears and clutches.

10.3 Main Motor

10.3.1 Main motor drive

The main motor consists of the motor and the drive board combined with the motor, and its rotation is controlled by control signals (three) and reference frequency.



LGC board
Main motor (PC board)
Main motor (Motor)
FG pulse
24v
Wave correction
Phase comparator
Speed comparator
Voltage detection circuit
Excitation phase switching section
Phase V
Photo-interuptor
Phase W
Phase U
Hall element A
Hall element C
Hall element B
CN318
(MAMCK)
MAMPL
MAMCW
MAMBK
MAMON
24v
Rotation control
Rotor position detection
Lock protection circuit

Fig. 10-301

(1) LGC board outputs the control signals for the main motor rotation. (MAMCW: Motor rotation direction setting, MAMON: Motor rotation command)

(2) The excitation phase switching section excites each phase of the main motor. → The main motor is rotated.

(3) Hall elements A, B and C detect the rotation position of the motor (rotor).

(4) The excitation phase switching section switches the excitation of each phase.
(The motor keeps rotating by repeating from (2) to (4).)

(5) An FG pulse is generated by the FG pattern of the encoder attached to the main motor.

(6) The FG pulse and the reference frequency from the LGC board are compared in terms of the phase and speed, and the difference is added to the IC1. The fluctuations in the power supply voltage is also added to the value. (Signal generation)

(7) In accordance with the signal obtained in the step (6), the excitation phase switching section changes the switching timing.
i.e. The FG pulse and reference frequency are controlled to be equal. → The main motor rotates at a fixed speed. (Locked range)

(8) When the main motor enters the locked range, the excitation phase switching section outputs the MAMPL signal to the LGC board. (“L” level)

(9) When the MAMBK from the LGC board becomes “L” level, the main motor is braked. When the MAMON signal becomes “H” level, the main motor is stopped.

10.3.2 Control signals

(1) MAMCW signal (LGC → MTR: Input)

This is a signal to switch the direction of the main motor rotation. When this signal becomes “L” level, the main motor rotates counterclockwise as seen from the rear side, and drives the developer unit, drum, fuser unit, etc to the appropriate direction.

(2) MAMPL signal (MTR → LGC: Output)

When the difference of the FG pulse cycle against the reference frequency is within ±6.25%, it is specified that the motor is in a lock range (normal rotation), and this MAMPL signal becomes “L” level. At this time, the LED “D4” is lit.

(3) MAMCK signal (LGC → MTR: Input)

This is a reference clock signal to rotate the main motor at a fixed speed.

(4) MAMBK signal (LGC → MTR: Input)

This is a signal to stop the main motor.

When it becomes “L” level, the main motor is braked.

(5) MAMON signal (LGC → MTR: Input)

This is a signal to turn ON/OFF the main motor. When it becomes “L” level, the motor is rotated.

Signal level of the motor circuit

Signal	Level “H”	Level “L”
MAMCW	CCW direction	CW direction
MAMPL	Abnormal rotation	Normal rotation
MAMCK	Reference clock signal	
MAMBK	Brake OFF	Brake ON
MAMON	Motor OFF	Motor ON

* The signal names are for the connector CN318 (LGC board).

10.4 Disassembly and Replacement

[A] Main motor

(1) Take off the rear cover (► Chapter 2.5.1 [H]).

(2) Take off the SYS board case (► Chapter 9.4 [D]).

(3) Take off the developer unit cooling fans-1 & -2 (► Chapter 11.6 [I]).

(4) Disconnect 1 connector.

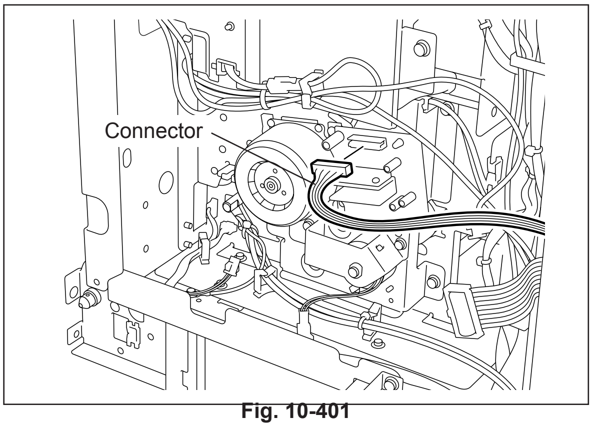


Fig. 10-401

(5) Remove 2 screws.

(6) Release 1 locking support and take off the main motor with the board.

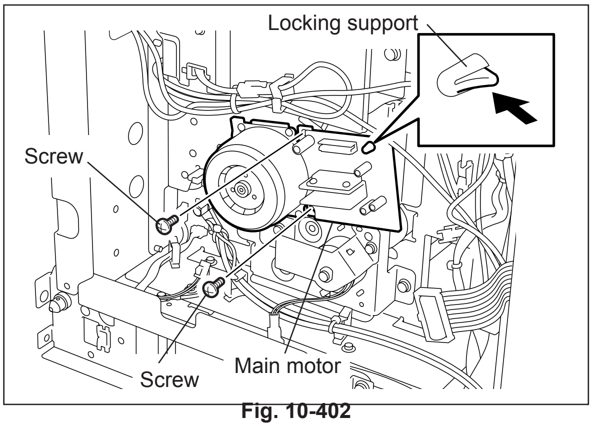

Locking support
Screw
Screw
Main motor

Fig. 10-402

[B] Registration clutch

(1) Take off the rear cover (► Chapter 2.5.1 [H]).

(2) Take off the SYS board case (► Chapter 9.4 [D]).

(3) Take off the developer cooling fan-2 (► Chapter 11.6 [I]).

(4) Disconnect 1 connector, loosen 1 setscrew and take off the registration clutch.

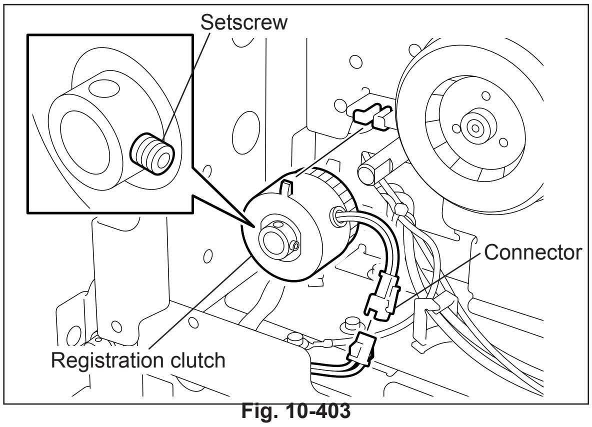

Setscrew
Connector
Registration clutch

Fig. 10-403

[C] Gear unit

(1) Take off the rear cover (► Chapter 2.5.1 [H]).

(2) Take off the SYS board case (► Chapter 9.4 [D]).

(3) Take off the developer unit cooling fans-1 & -2 (► Chapter 11.6 [I]).

(4) Take of the registration clutch (► Chapter 10.4 [B]).

(5) Disconnect 3 connectors.

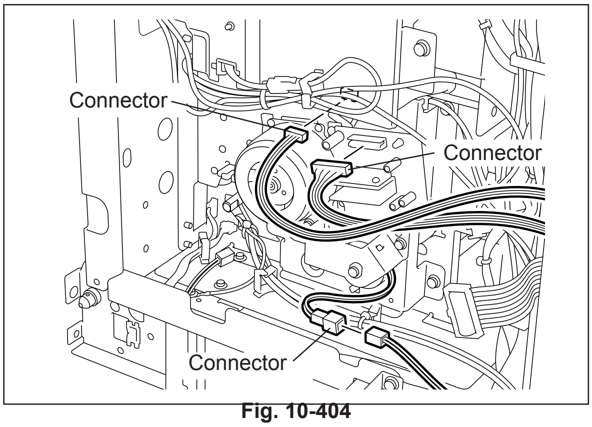

Connector
Connector
Connector

Fig. 10-404

(6) Disconnect 2 connectors.

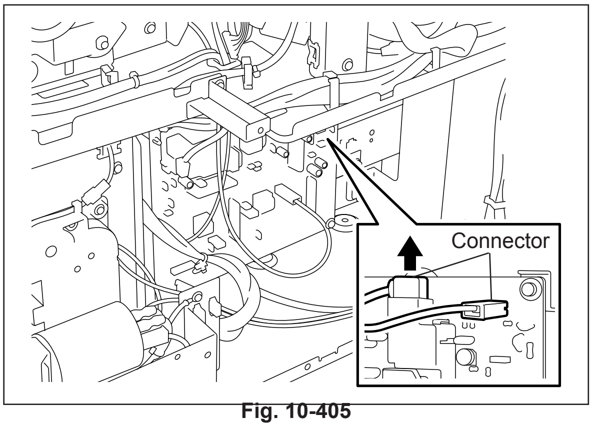


Fig. 10-405

(7) Remove 5 screws and take off the gear unit.

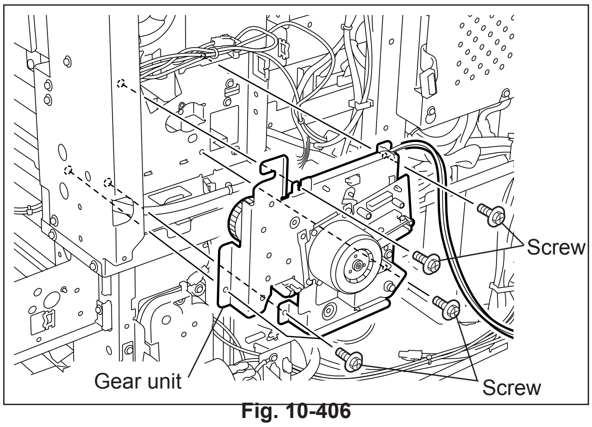

Screw
Gear unit
Screw

Fig. 10-406

[D] Developer drive clutch

(1) Take off the gear unit (► Chapter 10.4 [C]).

(2) Remove 2 screws and take off the bracket.

(3) Remove the bushing and take off the developer drive clutch.

Note:

Match the protruding portion of clutch with the position shown in the drawing for assembling.

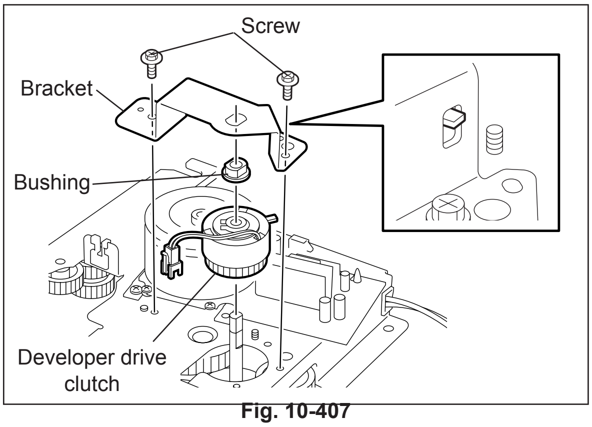

Screw
Bracket
Bushing
Developer drive clutch

Fig. 10-407

11. DRUM RELATED SECTION

11.1 Configuration

This chapter explains about the area around the drum, drum itself, image processing, their parts and control circuits.

This area mainly consists of the following components:

- Cleaner unit
  - Drum
  - Main charger
  - Cleaner
    - Cleaning blade
    - Toner recovery blade
    - Toner recovery auger
    - Toner bag full detection sensor -1
- Toner bag detection sensor -2
- Transfer / Separation charger
  - Transfer guide
  - Transfer charger
  - Separation charger
- Sub-separation fan / Exhaust fan
- Discharge LED
- Toner bag
- Developer unit cooling fan-1 / Developer unit cooling fan-2 / Middle fan
- Drum thermistor (in developer unit)
- High-voltage transformer
- Temperature/humidity sensor

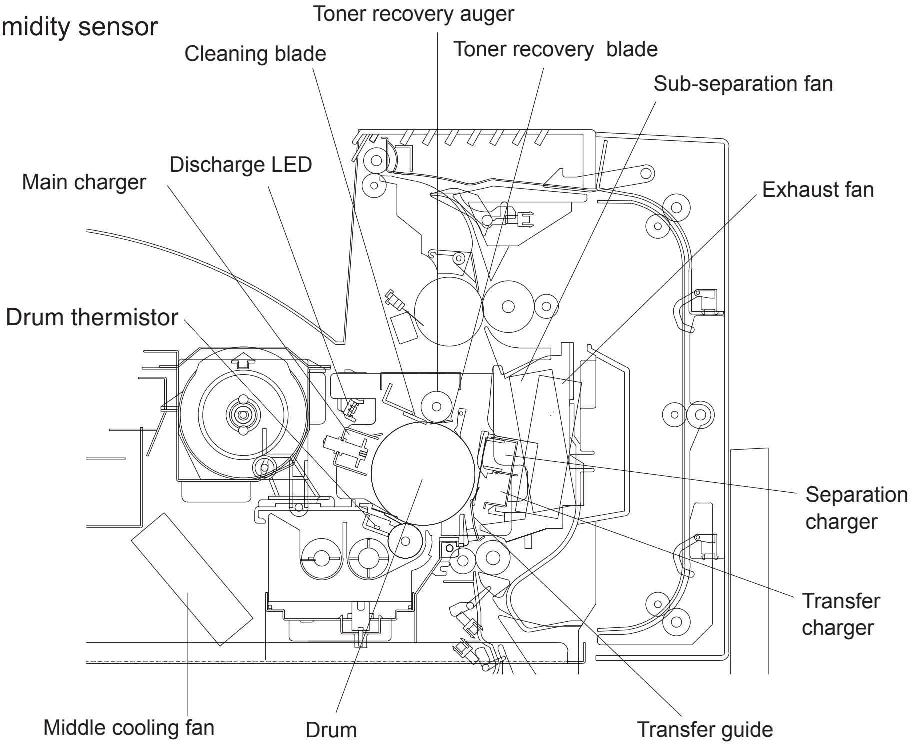

Toner recovery auger
Cleaning blade
Toner recovery blade
Sub-separation fan
Discharge LED
Main charger
Exhaust fan
Drum thermistor
Separation charger
Transfer charger
Middle cooling fan
Drum
Transfer guide

Fig. 11-101

11.2 Functions

(1) Drum

The drum is made of a cylindrical aluminum base coated with thin film of organic photoconductive substance.

The photoconductive object becomes insulative (the electrical resistance is high) when it is not exposed to the light and electrically conductive (the electrical resistance is low) when it is exposed to the light. This object is called a photoconductor.

(2) Main charger

The main charger consists of a metal rod with U-shaped section, insulated blocks at both ends of the rod and charger wire attached between them.

When a high voltage is applied to the charger wire, the air around it is charged (ionized). The ionized air then flows into the drum causing it to be charged. This phenomenon is called “corona discharge”. Negative charge caused by the corona discharge and grid is applied to the drum surface evenly in dark place. The main charger is equipped with a wire cleaner to clean the wire.

(3) Cleaner

(a) Cleaning blade

This blade is pressed against the drum surface with a constant force by the pressure springs, and scrapes off the residual toner from the drum surface.

(b) Recovery blade

This blade catches the toner scraped off by the cleaning blade.

(c) Toner recovery auger

This auger carries the residual toner scraped off to the toner bag.

(d) Toner bag full detection sensor -1

The sensor detects the toner bag full when it is pushed by the toner recovery auger in the cleaner which is given a pressure from the used toner in the toner bag.

(4) Transfer / Separation charger

(a) Transfer guide

This guide leads the paper transported from the feeding unit to the transfer section.

Positive (+) bias voltage is applied to the guide to prevent the transferability from being lowered under conditions such as high humidity.

(b) Transfer charger

The transfer charger applies a charge (positive (+) charge) which is contrary to the charging polarity of the toner to the back of the paper. The toner image is transferred electrostatically on paper by performing this corona discharge.

(c) Separation charger

After the transfer process, the corona discharge applies a bipolar charge (AC) on the back of the paper to separate the paper adhering to the drum surface by an electrostatic force absorbing.

(5) Toner bag full detection sensor -2

This transmissive-type sensor detects the full of toner bag when the used toner has reached to the full detection position in the toner bag.

"Toner bag full" is determined when either of the toner bag full detection sensors-1 and -2 detects full of toner. Printing is interrupted upon the detection of "Toner bag full" status, however, the paper already fed is subject to be printed and exited.

Detecting with the toner bag full detection sensor-1 may cause the overload of the drum cleaning blade, and even the excessive toner may be fallen from the toner bag. The reason why the toner bag detection sensor-2 is installed is to detect full of toner prior to the occurrence of these problems.

When the sensors are in trouble, "Toner bag full" is determined instead of "Call for service". If "Toner bag full" status is not cleared, the sensors, harnesses and LGC board need to be checked.

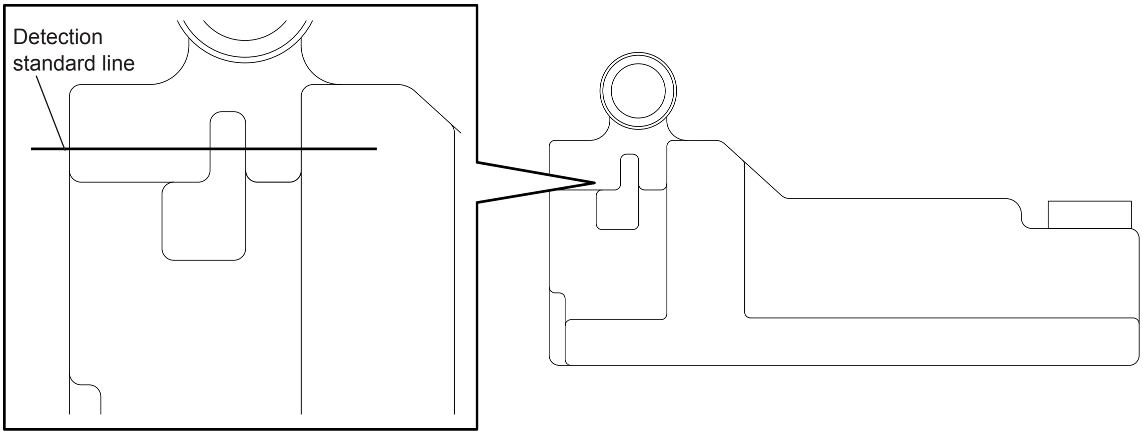


Fig. 11-201

(6) Sub-separation fan / Exhaust fan

The sub-separation fan works to assist the separation of paper from the drum surface by absorbing the air from the back of the paper. The exhaust fan removes ozone generated by corona discharge with the ozone filter, and also cools down the inside of the equipment.

(7) Discharge LED

Discharging is a process to decrease or eliminate the static electricity on the drum surface.
The electrical resistance of the photosensitive layer is decreased by the light irradiation, and the residual charge on the drum surface is neutralized and eliminated (cleaned). The electrical potential of the drum surface is fixed to a certain amount before the drum is charged (The pre-exposure effect).

(8) Toner bag

The residual toner scraped off the drum surface by the cleaning blade is disposed in this bag.

(9) Developer unit cooling fan-1 / Developer unit cooling fan-2 / Middle fan

The developer unit cooling fans-1 and -2, which work to cool down the inside of the equipment, absorb the air from the back of the equipment. The middle fan discharges the air around the developer unit.

(10) Drum thermistor

The electrical charge amount of drum surface varies depending on the drum surface temperature. Therefore, this thermistor detects the drum surface temperature to control to maintain the charge amount at a certain level.
Additionally, the exhaust fan and developer unit cooling fans-1 and -2 change their rotation speed according to the temperature detected by the drum thermistor when the equipment is in ready status or scanning the image.

(11) High-voltage transformer

This is board to generate the output control voltage of the main charger, transfer charger, separation charger and developer bias.

(12) Temperature/Humidity sensor

This sensor detects the temperature and humidity inside of the equipment since the auto-toner output, main charger grid, developer bias and laser output are affected by environmental elements such as temperature or humidity.

11.3 Output Control Circuits of High-Voltage Transformer

11.3.1 Overview

- Generate the output control voltage Vc of the main charger, transfer/separation charger, transfer guide bias and developer bias.
- Convert Vc ➔ The current is output linearly.

11.3.2 Description of operations

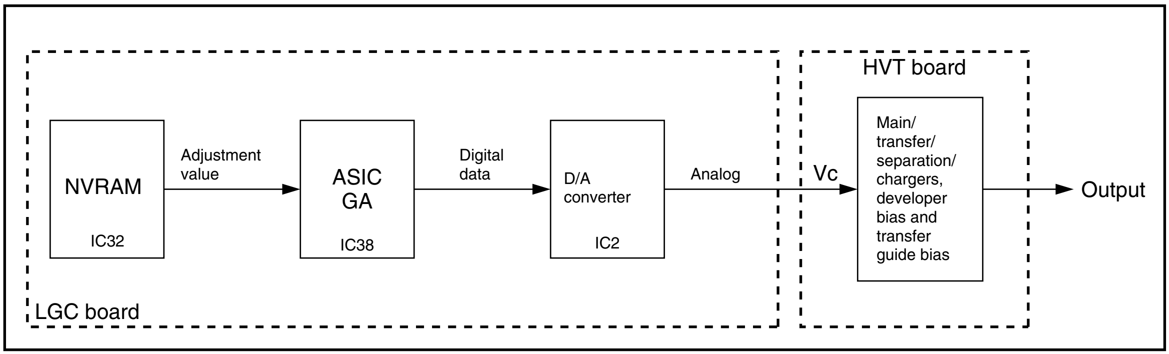

HVT board
NVRAM
IC32
Adjustment value
ASIC GA
IC38
Digital data
D/A converter
IC2
Analog
Vc
Main/ transfer/ separation/ chargers, developer bias and transfer guide bias
Output
LGC board

Fig. 11-301

- Outputs the adjustment value of the main, transfer and separation chargers, developer bias and transfer guide bias in the NVRAM to the ASIC GA.

↓

- Outputs the control voltage data from the ASIC GA to the D/A converter.

↓

- Converts to the analog data by the D/A converter.

↓

- Outputs the control voltage Vc to the main, transfer and separation chargers, developer bias and transfer guide bias transformer.

↓

- The main, transfer and separation chargers, developer bias and transfer guide bias transformer generate output current or voltage which is proportional to the control voltage Vc.
  - * Adjustment of the control voltage Vc (change of adjustment data) is performed in the adjustment mode (05).
  - * The output value of the transfer guide bias is fixed when the high-voltage transformer is shipped from the factory.

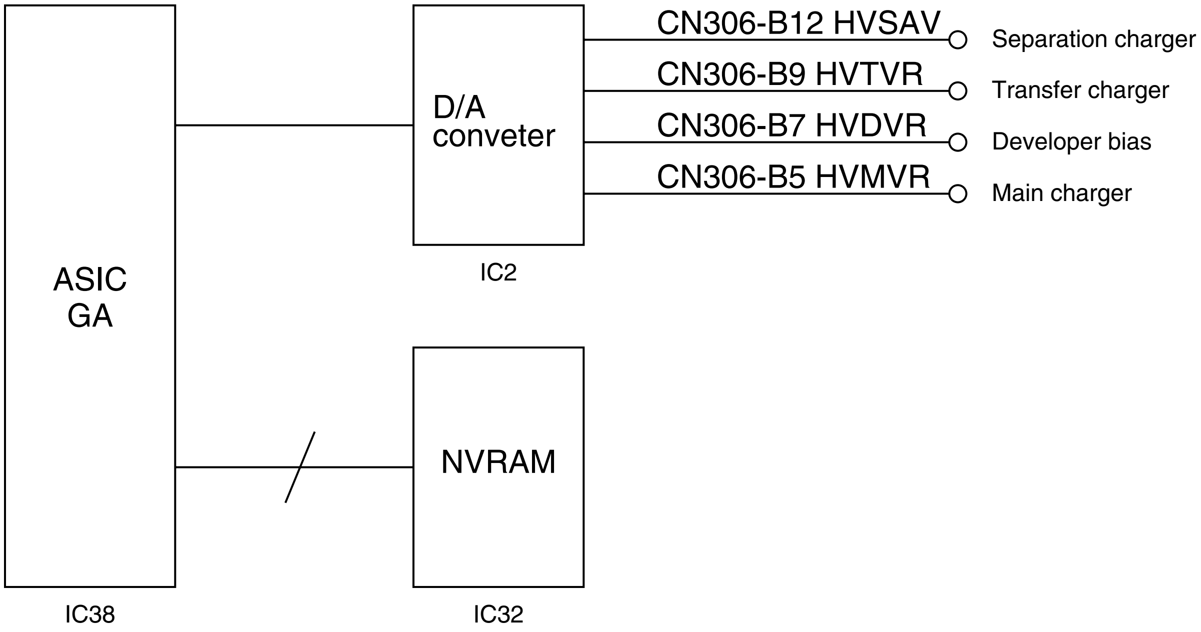

CN306-B12 HVSAV
CN306-B9 HVTVR
CN306-B7 HVDVR
CN306-B5 HVMVR
Separation charger
Transfer charger
Developer bias
Main charger
D/A conveter
IC2
ASIC GA
IC38
NVRAM
IC32

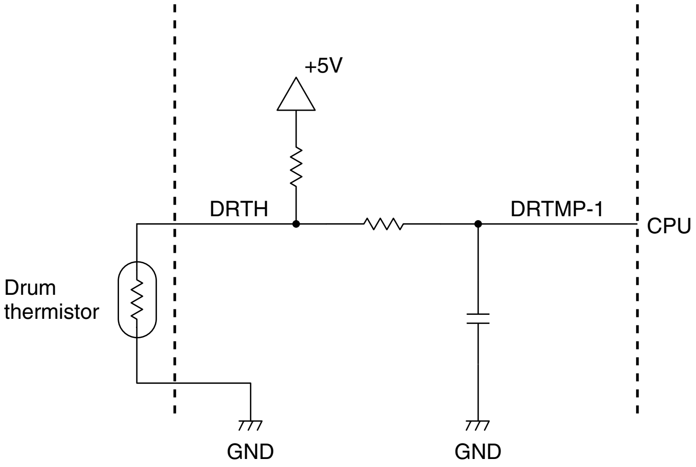
Fig. 11-302

11.4 Drum Temperature Detection Circuit

(1) Purpose of the drum temperature detection circuit

The amount of charge on the drum surface varies greatly with the surface temperature of the drum. This circuit detects the temperature of the drum surface, and the amount of charge on the drum surface is controlled to be constant based on the result.

(2) Configuration of the drum temperature detection circuit



Drum temperature detection circuit

Fig. 11-401

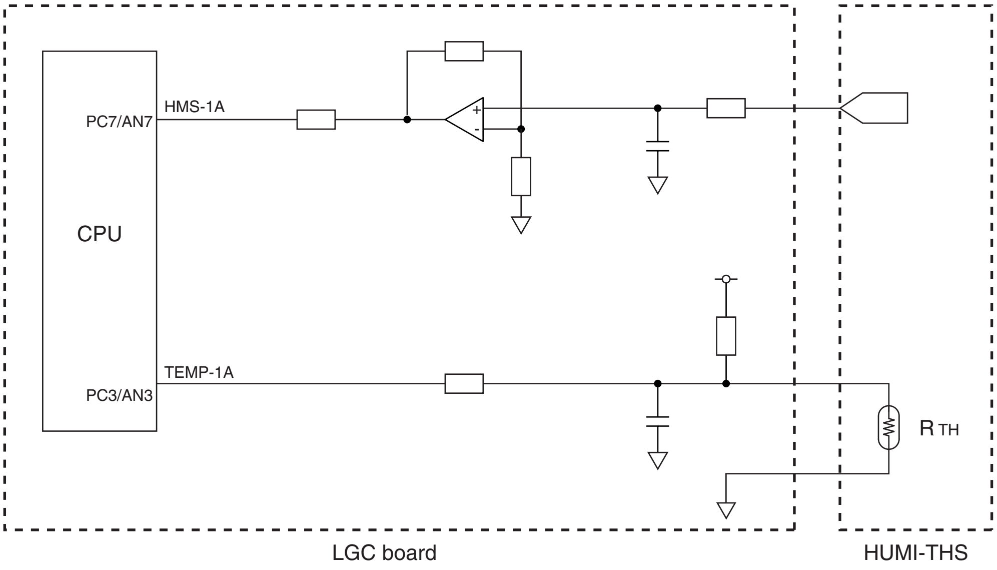
11.5 Temperature/Humidity Sensor

11.5.1 General description

This sensor measures the temperature and humidity inside the equipment.

11.5.2 Construction

Temperature/humidity control circuit is configured as follows:



HMS-1A
PC7/AN7
CPU
TEMP-1A
PC3/AN3
R TH
LGC board
HUMI-THS

Fig. 11-501

11.6 Disassembly and Replacement

[A] Cleaner unit

(1) Open the front cover, take off the toner bag and front cover (► Chapter 2.5.1 [A]).
(2) Take off the developer unit (► Chapter 12.5 [A]).
(3) Open the bypass unit, ADU and jam access cover.
(4) Release the latch and remove the toner bag full detection sensor-2.
(5) Loosen 2 screws and take off the cleaner unit.

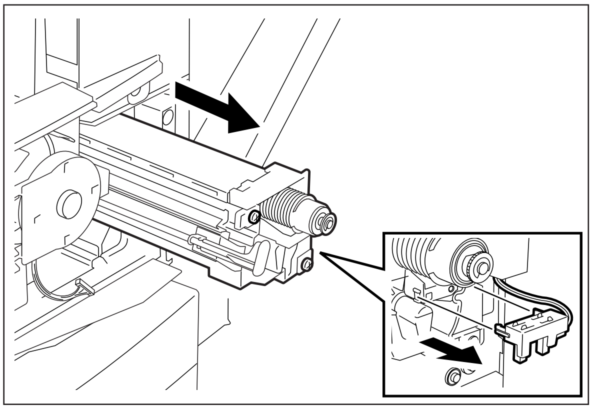


Fig. 11-601

Notes:

1. Hold the cleaner unit which has been taken off as shown in the figure.
2. Do not touch the drum surface.

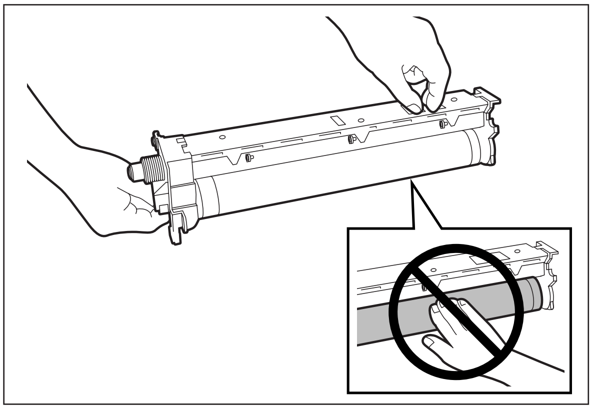


Fig. 11-602

[B] Main charger

(B-1) Main charger

(1) Take off the cleaner unit (► Chapter 11.6 [A]).
(2) Release the latch and pull out the main charger to the direction of the arrow.

Note:

Be careful not to touch or scratch the drum surface at this time.

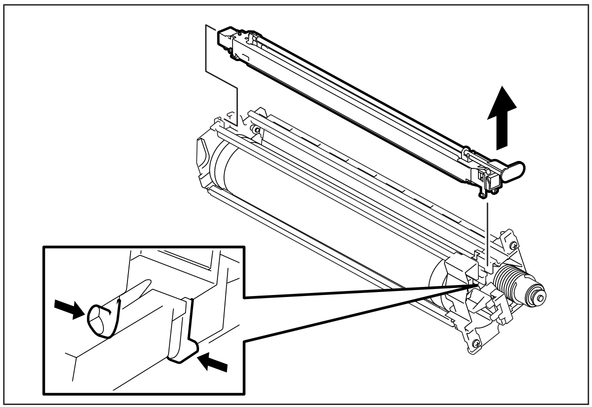


Fig. 11-603

(B-2) Main charger grid PM

(1) Push the terminal head at the front side and remove the grid.

Note:

Do not touch the mesh area of the grid.

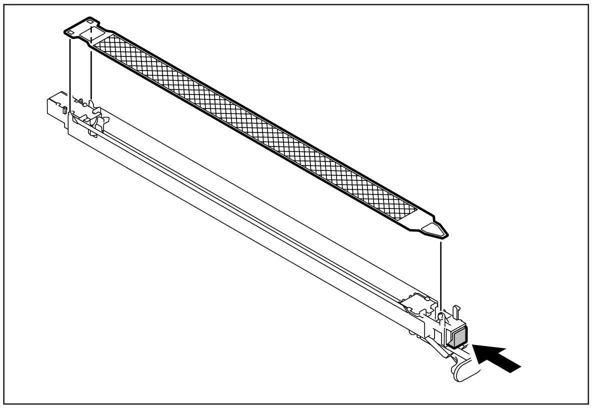


Fig. 11-604

(B-3) Main charger wire PM

* Length: 363 mm (tungsten wire) diameter: 0.06 mm

(1) Take off each terminal cover of the front and rear sides.

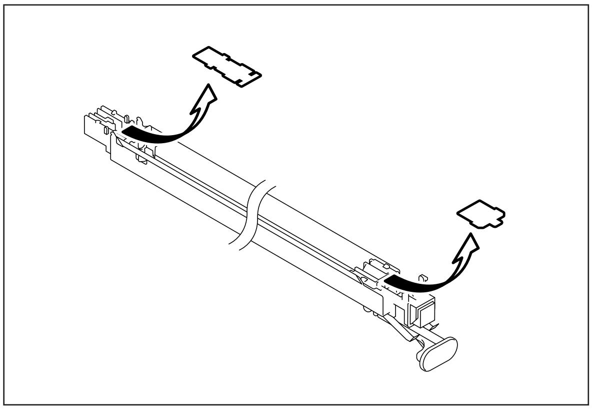


Fig. 11-605

(2) Remove the damper, terminal, spring and wire.

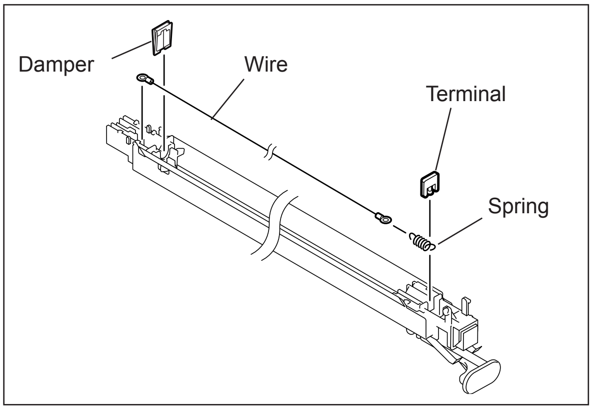


Fig. 11-606

(B-4) Charger wire cleaning pad

(1) Release the charger wire cleaner shaft from the hooks of the charger wire cleaning pads.

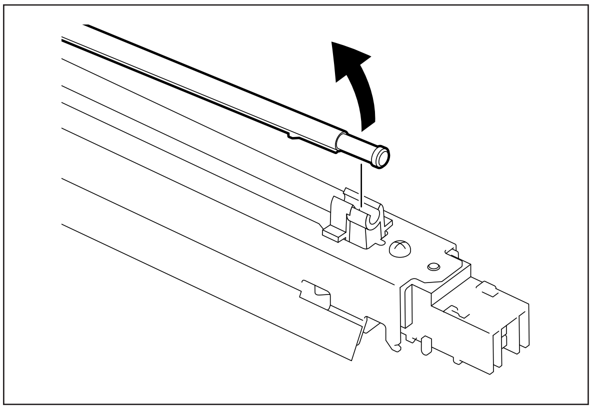


Fig. 11-607

(2) Remove the charger wire cleaning pads.

Note:

When installing, make sure that 2 charger wire cleaning pads are away from the wire while the charger wire cleaner shaft is at the rear side.

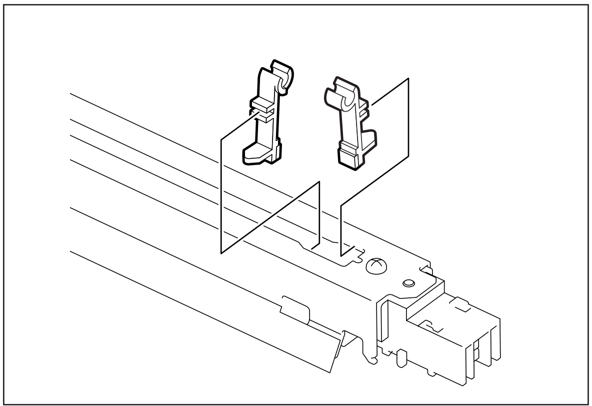


Fig. 11-608

[C] Drum PM

(1) Pull out the cleaner unit and take off the main charger (► Chapter 11.6 [A] (B-1)).

(2) Release the latch and remove the cleaner stay.

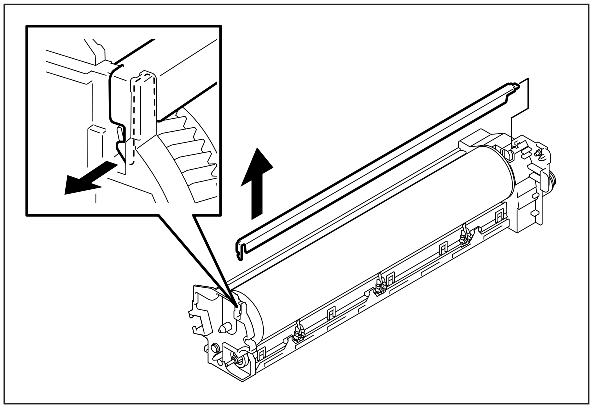


Fig. 11-609

(3) Push the lever down to the left and release the lock. Then pull out the drum shaft.

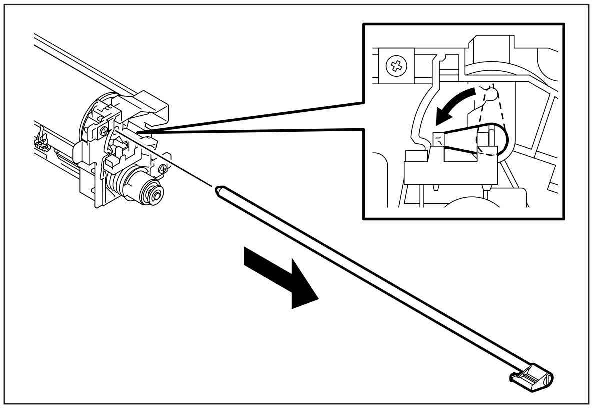


Fig. 11-610

(4) Lift up the drum and take it off.

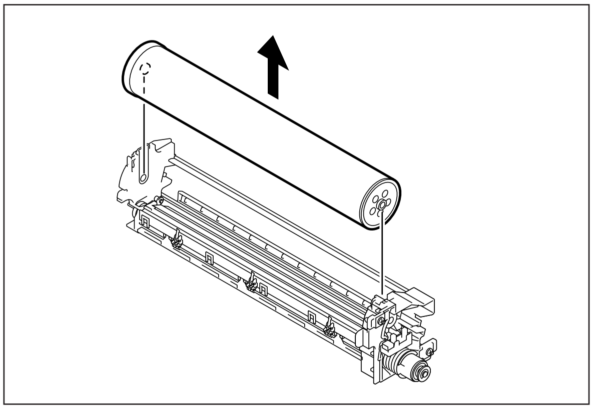


Fig. 11-611

(5) Remove 6 screws and take off 2 flywheels.

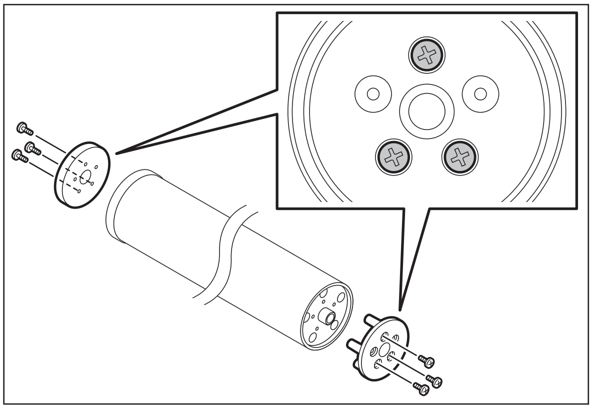


Fig. 11-612

Notes:

1. When installing, make sure that the pressure of cleaning blade is released with the jig.
2. Insert the head of the jig to the space shown in the figure while pushing the blade holder.
3. Be careful not to touch or scratch the edge of cleaning blade.

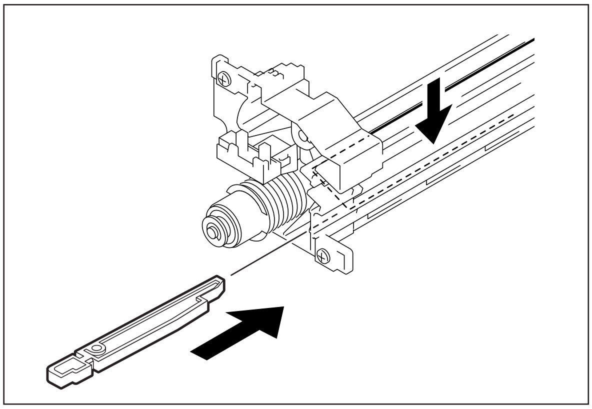


Fig. 11-613

[D] Cleaner

(D-1) Cleaning blade PM

(1) Take off the cleaner unit. Then take off the main charger and drum (► Chapter 11.6 [A] (B-1) [C]).

(2) Remove 2 screws and cleaning blade.

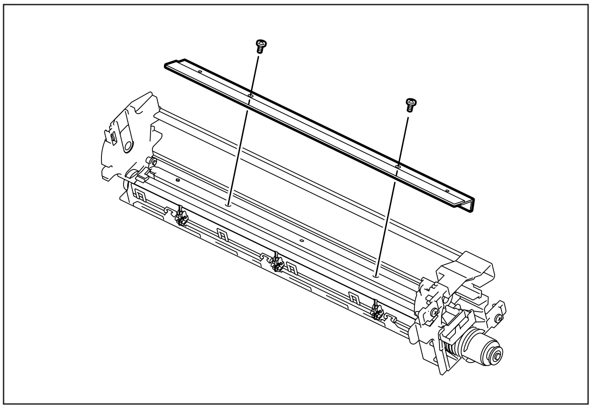


Fig. 11-614

Note:

Pay attention to the following points when installing the cleaning blade.

1. Do not touch the end face of the cleaning blade and not make a scratch or similar.
2. The cleaning blade should not contact with the seals. (2 places)
3. If it contacts, shift the screw from A to B and adjust it so as not to contact with the seals.

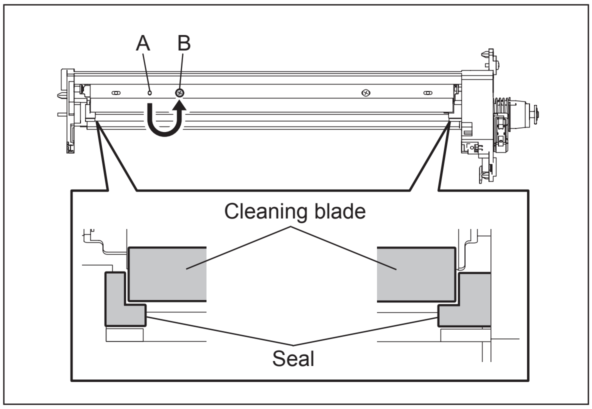


Fig. 11-615

(D-2) Recovery blade

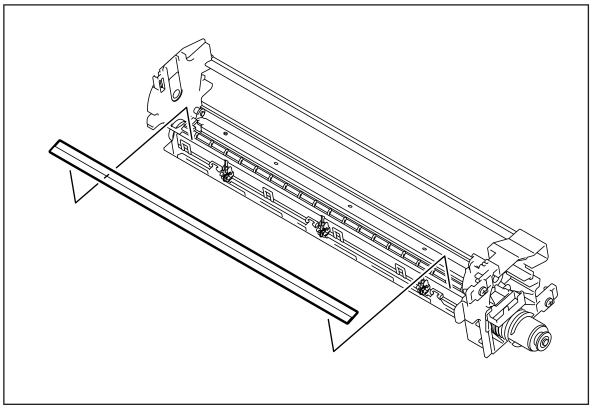


Fig. 11-616

(1) Remove the cleaning blade (► Chapter 11.6 (D-1)).

(2) Remove the recovery blade.

Notes:

1. When attaching the recovery blade, clean the surface of the frame first. Be careful not to deform the blade.
2. Attach the recovery blade while pushing it to the step on the surface of the frame.
3. Press the stuck part with your finger to attach the blade securely.

(D-3) Separation finger PM

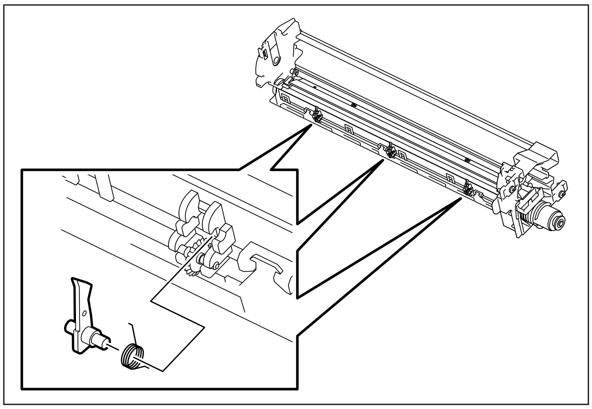


Fig. 11-617

(1) Remove the drum (► Chapter 11.6 [C]).

(2) Release the 3 separation fingers.

Notes:

1. When replacing the separation fingers, make sure that the drum has been taken off first since the fingers may scratch the drum surface.
2. When the separation fingers have been replaced, check if their pressure movement is normal by moving them with your fingers.

[E] Transfer / Separation charger

(E-1) Transfer / Separation charger

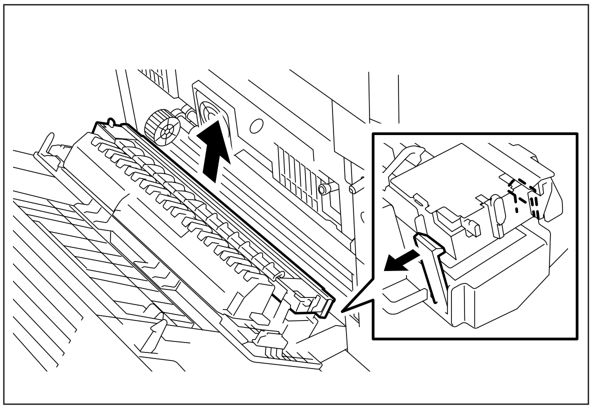


Fig. 11-618

(1) Open the bypass tray, ADU and jam access cover.

(2) Release the latches and take off the transfer and separation chargers.

Note:

When installing the transfer and separation chargers, make sure not to deform the springs.

(E-2) Charger wire PM

* Length: 363 mm (tungsten wire) diameter:
0.06 mm (For both transfer and separation)

(1) Remove the separation supporter.

(2) Take off each terminal cover on both front and rear sides.

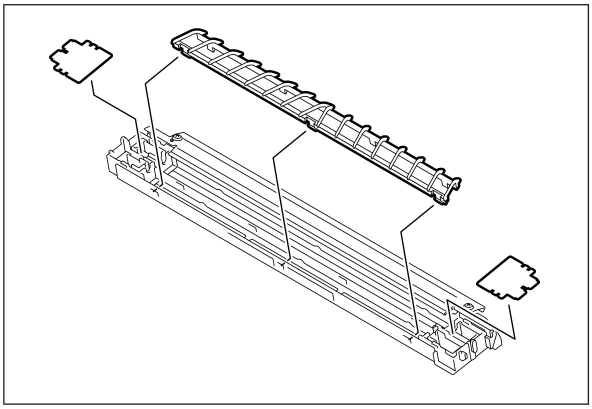


Fig. 11-619

(3) Remove the terminals, springs and wires.

Notes:

Be careful of the followings when installing the wire.

1. Insert the wire securely into the V-grooves of the front and rear sides.
2. Do not twist the wire.
3. Do not touch the wire directly with bare hands.

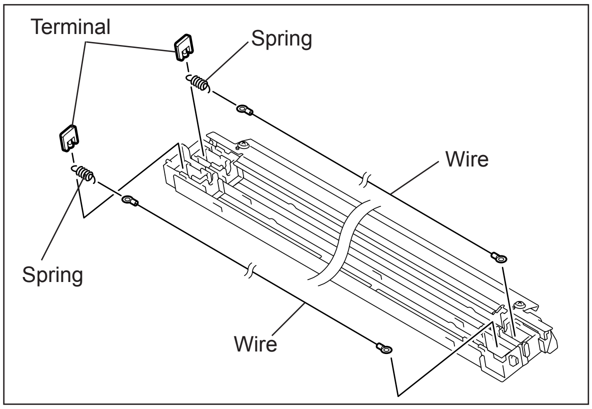


Fig. 11-620

[F] Exhaust fan / Sub-separation fan

(1) Open the jam access cover.

(2) Take off the transfer and separation chargers (► Chapter 11.6 (E-1)).

(3) Remove 4 screws and disconnect 1 connector. Then take off the fan cover.

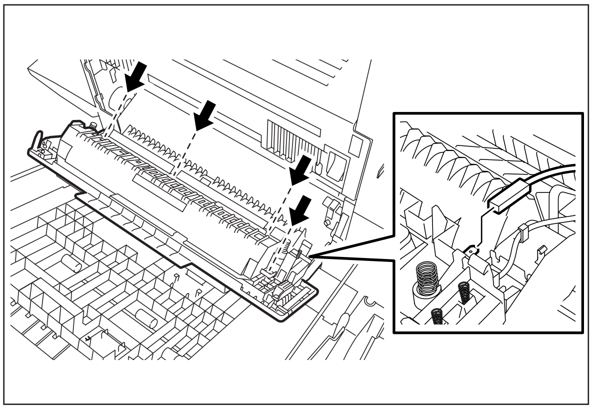


Fig. 11-621

(4) Remove 3 screws and 3 washers. Disconnect 1 connector each from the exhaust fan and sub-separation fan. Then take off the exhaust fan and sub-separation fan.

Note:

When installing, pay attention to the direction of the wind from the fan.

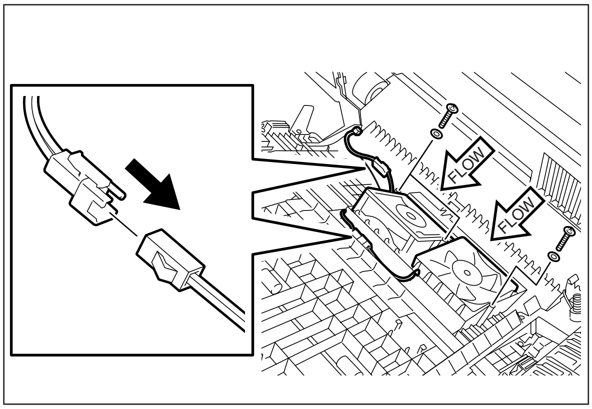


Fig. 11-622

[G] Discharge LED

(1) Take off the developer unit and cleaner unit (► Chapters 12.5 [A] and 11.6 [A]).

(2) Disconnect 1 connector and remove 1 screw. Then take off the discharge LED unit.

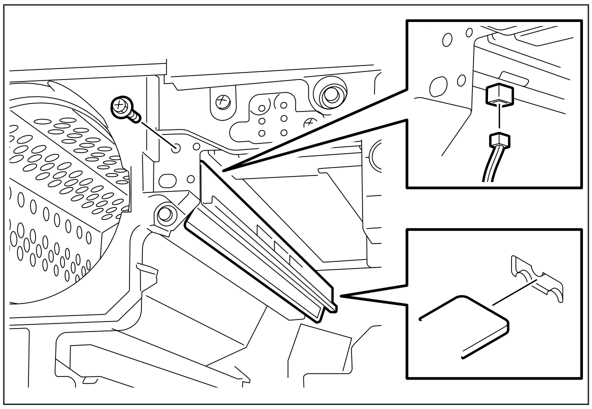


Fig. 11-623

(3) Take off the discharge LED.

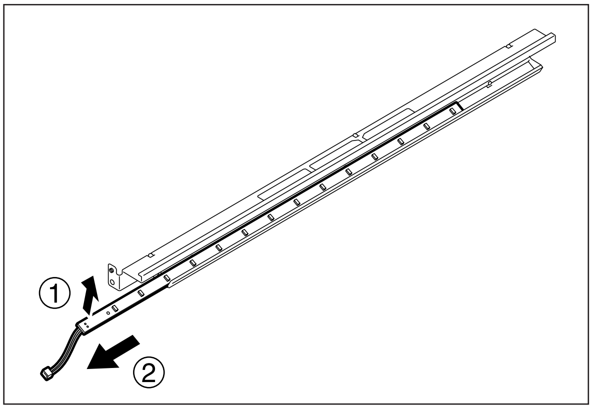


Fig. 11-624

[H] Toner bag full detection sensor

(H-1) Toner bag full detection sensor-1

(1) Take off the rear cover (► Chapter 2.5.1 [C]).

(2) Take off the registration clutch and gear unit (► Chapter 10.4 [B] [C]).

(3) Disconnect 1 connector and remove 1 screw. Then take off the toner bag full detection sensor-1 with the whole bracket.

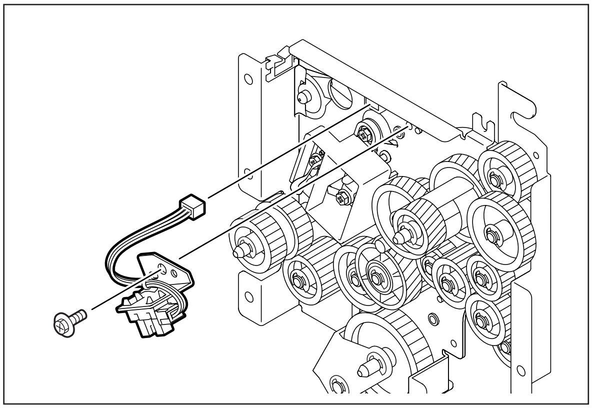


Fig. 11-625

(4) Disconnect 1 connector and take off the toner bag full detection sensor-1 from the bracket.

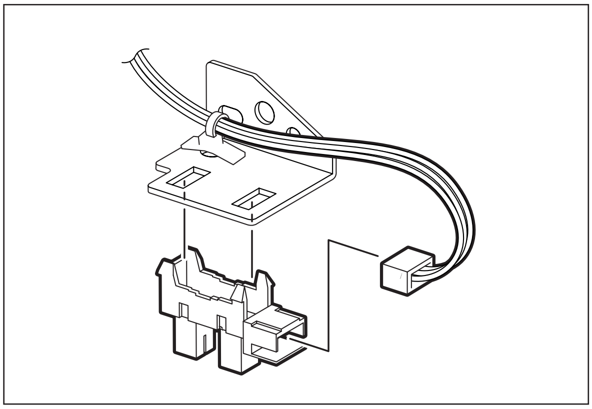


Fig. 11-626

(H-2) Toner bag full detection sensor-2

(1) Open the front cover.

(2) Disconnect 1 connector and take off the toner bag full detection sensor-2.

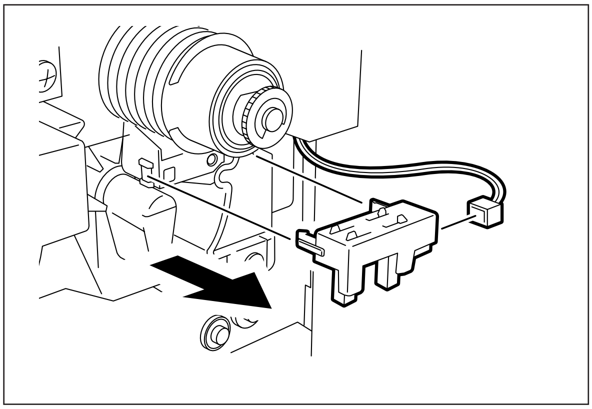


Fig. 11-627

[I] Developer unit cooling fan

(I-1) Developer unit cooling fan-2

(1) Take off the rear cover (► Chapter 2.5.1 [C]).

(2) Take off the SYS board with the whole case (► Chapter 2.5.2 [C]).

(3) Disconnect 1 connector and release the harness from 1 harness clamp.

(4) Remove 2 screws and take off the duct.

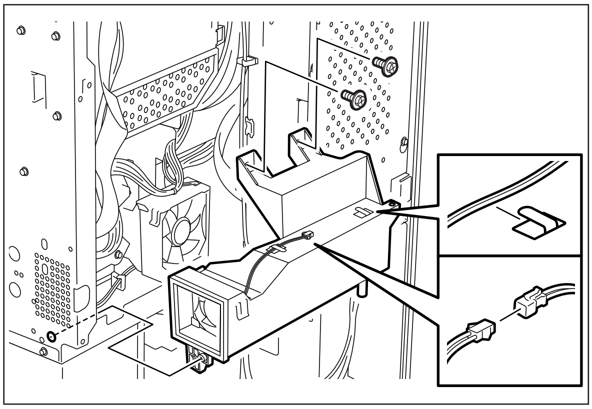


Fig. 11-628

(5) Release the harness from 1 harness clamp.

(6) Remove 1 screw and take off the duct cover.

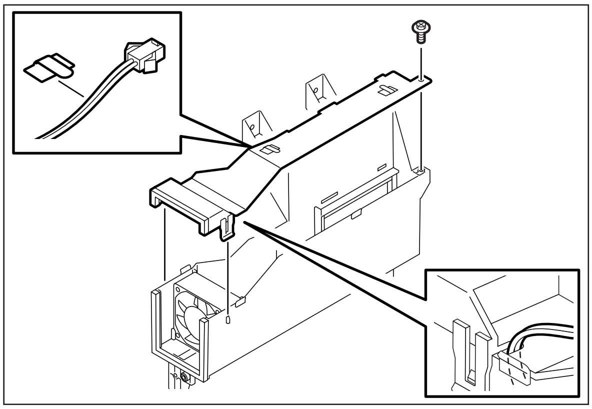


Fig. 11-629

(7) Take off the developer unit cooling fan-2.

Note:

When installing, pay attention to the direction of the wind from the fan.

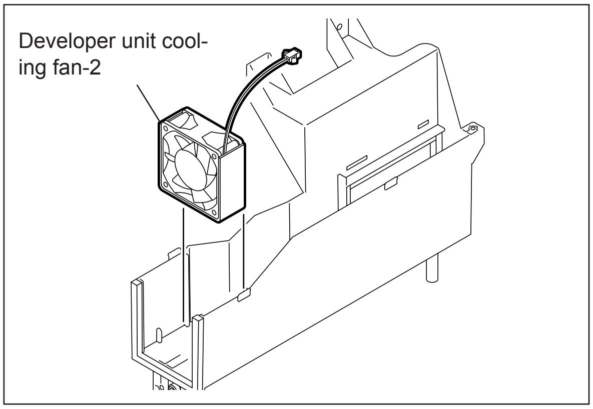


Fig. 11-630

(I-2) Developer unit cooling fan-1

(1) Take off the rear cover (► Chapter 2.5.1 [C]).

(2) Take off the duct of developer unit cooling fan-2 (► Chapter 11.6 (I-1)).

(3) Release 2 latches and take off the duct cover.

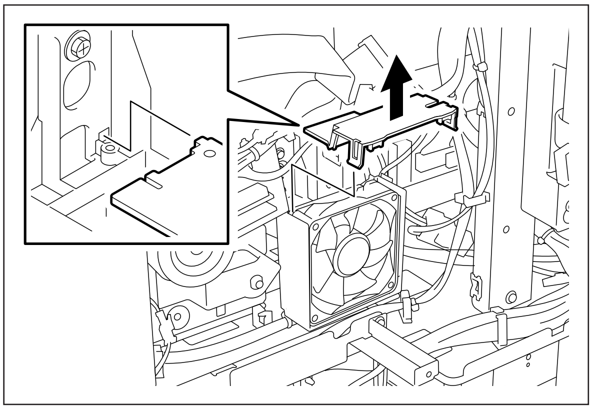


Fig. 11-631

(4) Disconnect 1 connector and take off the developer unit cooling fan-1.

Note:

When installing, pay attention to the direction of the wind from the fan.

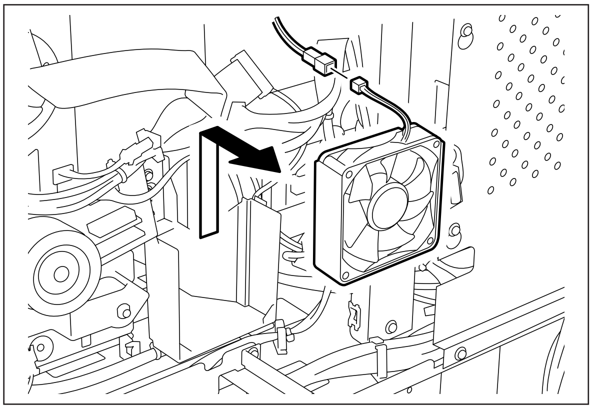


Fig. 11-632

(I-3) Developer unit cooling fan unit-1

(1) Take off the rear cover (► Chapter 2.5.1 [C]).

(2) Take off the SYS board with the whole case (► Chapter 2.5.2 [C]).

(3) Remove 1 screw and disconnect 1 connector and take off the developer unit cooling fan unit-1.

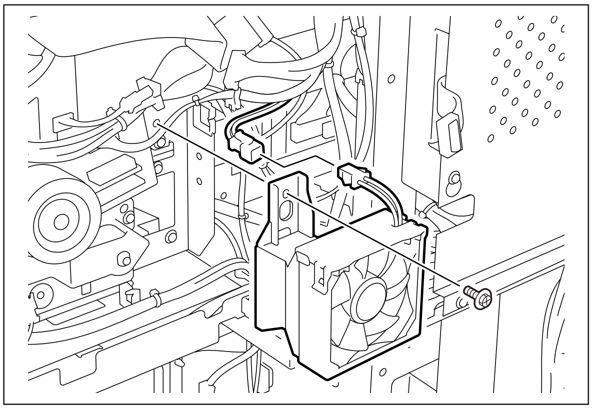


Fig. 11-633

[J] Middle fan

(1) Open the front cover. Take off the toner bag, toner cartridge, developer unit and cleaner unit (► Chapters 12.5 [A] and 11.6 [A]).
(2) Take off the receiving tray and tray back cover (► Chapter 2.5.1 [H] [I]).
(3) Take off the toner cartridge drive unit and discharge LED (► Chapter 12.5 [I] [G]).
(4) Remove 1 screw and take off the toner bag holder.
(5) Remove 2 screw and take off the toner cartridge cover.
(6) Take off the rear cover, SYS board case, developer unit cooling fan-2 and developer unit cooling fan unit-1 (► Chapters 2.5.1 [C], 2.5.2 [C] and 11.6 [I]).
(7) Take off the registration clutch and gear unit (► Chapter 10.4 [B] [C]).

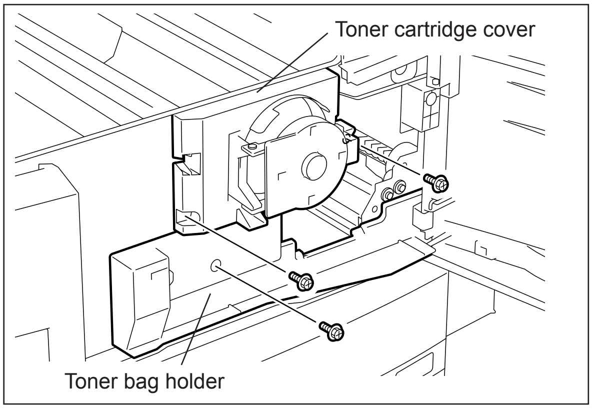


Fig. 11-634

(8) Remove 3 screws on the rear side.

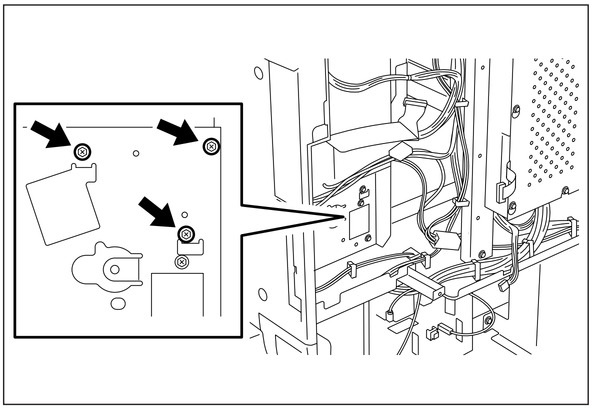


Fig. 11-635

(9) Remove 3 screws on the front side and release the harnesses from 3 harness clamps.
(10) Take off the bracket of the toner cartridge.

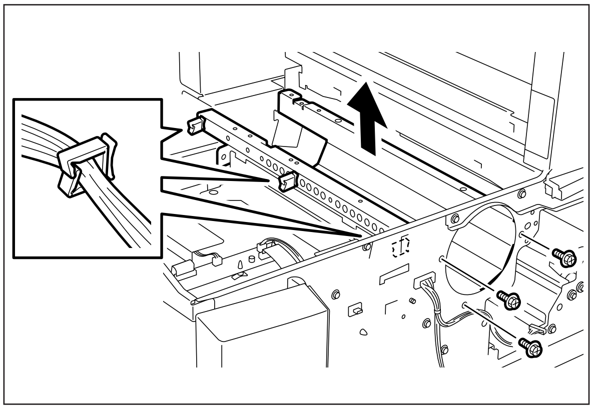


Fig. 11-636

(11) Remove 1 screw and stand the developer unit guide aside.

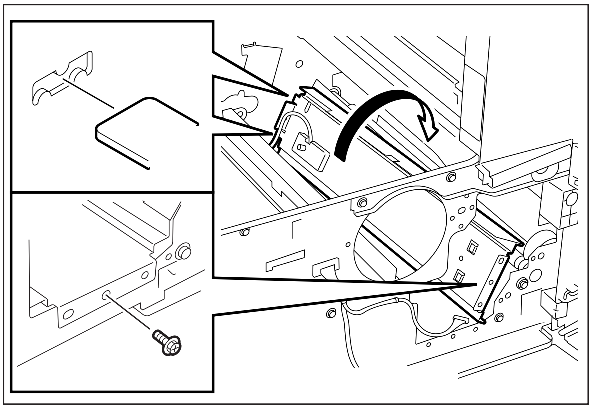


Fig. 11-637

(12) Remove 2 screws and take off the middle fan duct.

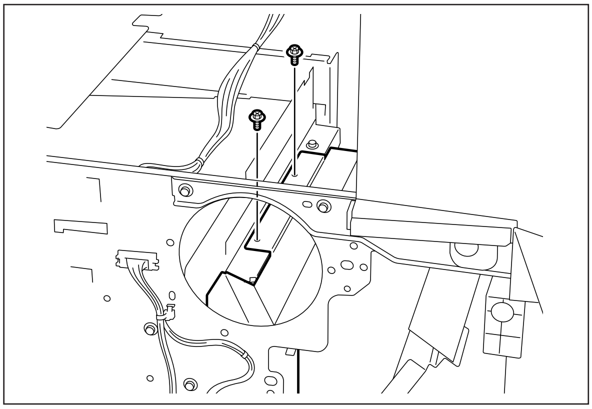


Fig. 11-638

(13) Disconnect 1 connector and remove 2 screws and take off the middle fan.

Note:

When installing, pay attention to the direction of the wind from the fan.

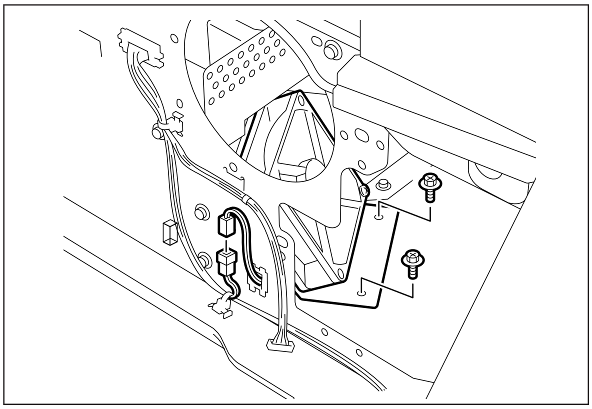


Fig. 11-639

[K] Temperature / Humidity sensor

(1) Open the front cover.

(2) Take off the receiving tray (► Chapter 2.5.1 [H]).

(3) Disconnect 1 connector and remove 1 screw. Then take off the temperature / humidity sensor with the whole cover.

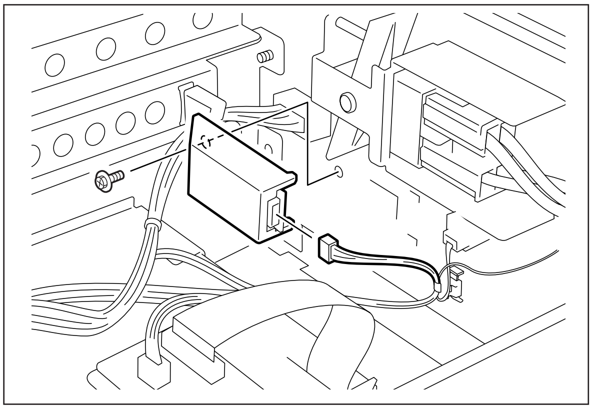


Fig. 11-640

(4) Remove 1 screw and take off the temperature / humidity sensor from the cover.

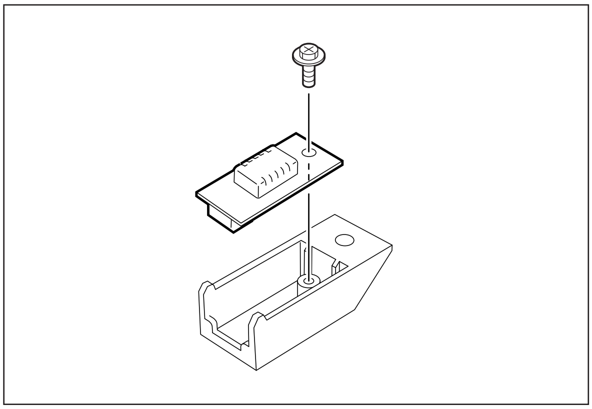


Fig. 11-641

12. DEVELOPMENT SYSTEM

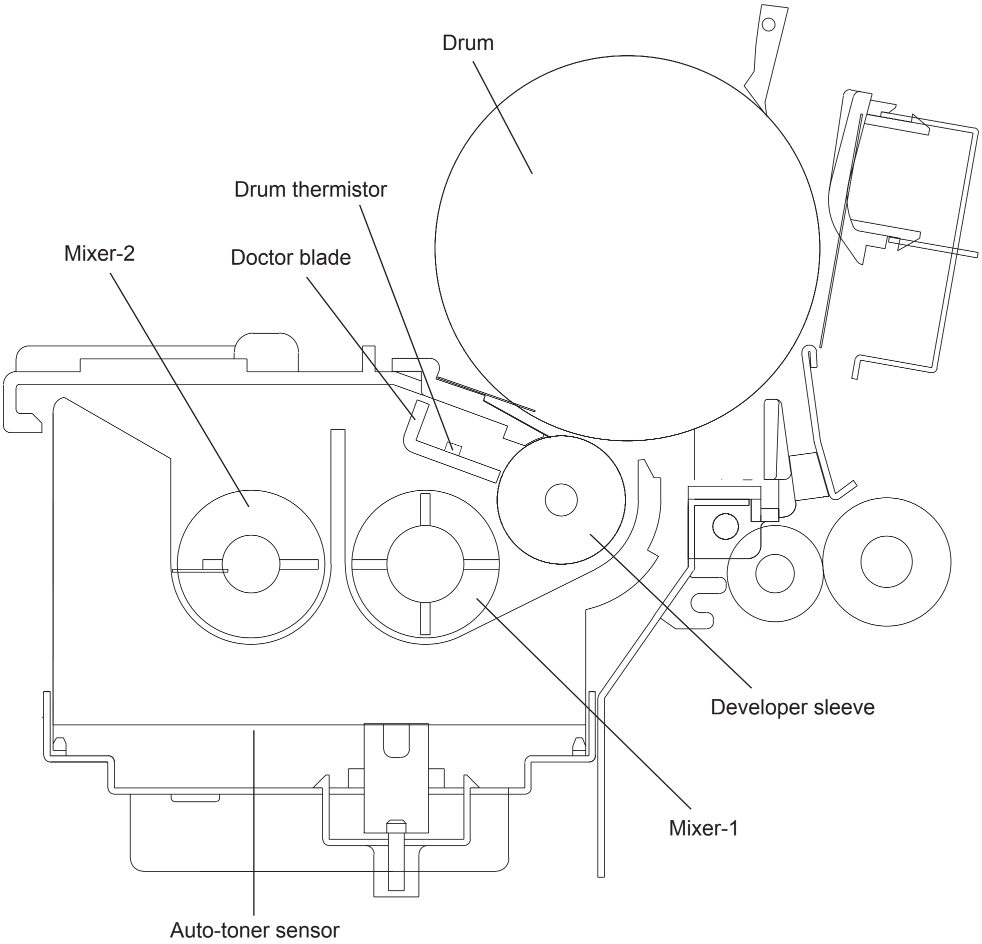
12.1 Configuration

Development system consists of the following unit, components and control circuits.

Toner cartridge drive unit / Toner cartridge detection switch

Temperature/humidity sensor (► chapter 11)

- Developer unit
  - Developer material
  - Mixers -1 and -2
  - Developer sleeve (magnetic roller)
  - Doctor blade
  - Auto-toner sensor
  - Drum thermistor (► chapter 11)


Drum
Drum thermistor
Mixer-2
Doctor blade
Developer sleeve
Mixer-1
Auto-toner sensor

[Sectional view of developer unit]

Fig. 12-101

12.2 Functions

(1) Toner cartridge drive unit / Toner cartridge detection switch

The toner cartridge is filled with toner. The toner motor drives the cartridge to supply the toner to the developer unit.

The toner cartridge detection switch detects whether the toner cartridge is installed.

(2) Developer unit

(a) Developer material

The developer material is made of a mixture of the carrier and toner.

The carrier is an electrical conductive ferrite whose size is 30μm to 100μm. The toner is a resin particle whose size is 5μm to 20μm.

The developer material needs periodic replacement since its quality is deteriorated by long use.

(b) Mixers-1 and -2

Friction is generated by mixing the developer material. The carrier is charged to (+) and the toner to (–), and the image is formed on the drum surface by the static electricity caused by the friction.

(c) Developer sleeve (Magnetic roller)

This is an aluminum roller with a magnet inside. The magnet works to absorb the developer material and forms the magnetic brush. The magnet is fixed and only the sleeve around is rotated. This rotation makes the magnetic brush of the developer sleeve sweep over the drum surface and perform development.

(d) Doctor blade

Doctor blade controls the amount of the developer material transported by the developer sleeve so that the magnetic brush of the developer material contacts with the drum surface properly.

(e) Auto-toner sensor

The carrier and the toner (toner density) in the developer material should be always fixed to a certain ratio to output normal images. The auto-toner sensor detects the inclusion ratio of the toner in the developer material by using a magnetic bridge circuit. When the quantity of toner becomes insufficient, the toner motor is driven to supply the toner from the toner cartridge.

12.3 Drive Circuit of Toner Motor

The toner motor (brush motor) is a motor to supply toner from the toner cartridge to the developer unit.

The toner motor is driven by the transistor TA8428 (LGC board: IC51).

Circuit diagram of the toner motor

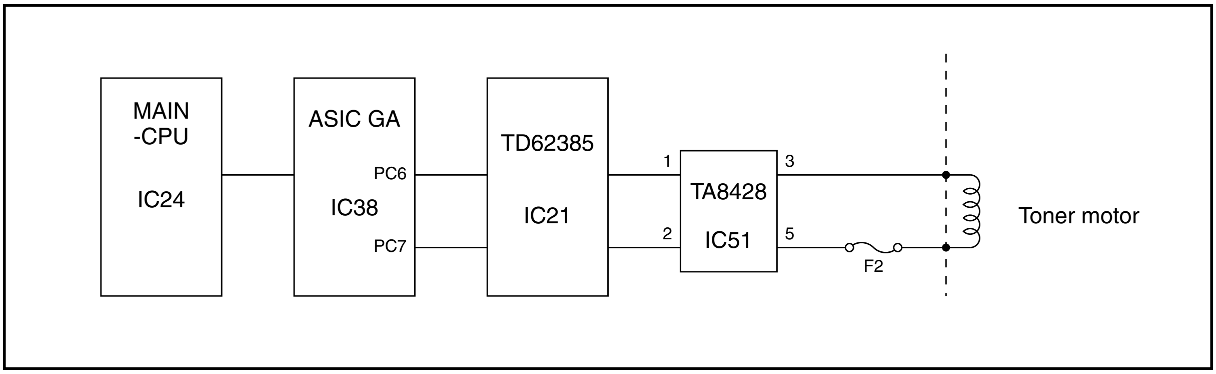


Fig. 12-301

Motor driver TA8428 (IC51) is connected with both ends of the motor wire.

— When the PC6 (TNRM1-1) of the ASIC GA becomes “H” and PC7 (TNRM2-1) becomes “L” levels, current flows into the motor wire and the motor is rotated.

— When both of PC6 (TNRM1-1) and PC7 (TNRM2-1) of the ASIC GA become “H” level, the motor is braked and stopped.

— When both of PC6 (TNRM1-1) and PC7 (TNRM2-1) of ASIC GA become “L” level, the motor waits for the next command (the motor is stopped).

12.4 Auto-Toner Circuit

12.4.1 General description

(1) Function of the auto-toner circuit

- Detects the toner density in the developer material, and supplies toner when the density is lowered to a certain level.
- Detects that there is no toner left in the cartridge (toner-empty detection).

(2) The auto-toner circuit consists of the following:

· Auto-toner sensor	: Detects the toner density.
· Control section	: Controls the toner density so that the toner in the developer material is fixed to certain ratio.
· Toner motor	: Supplies toner to the developer material.
· Display	: Indicates toner-empty information.

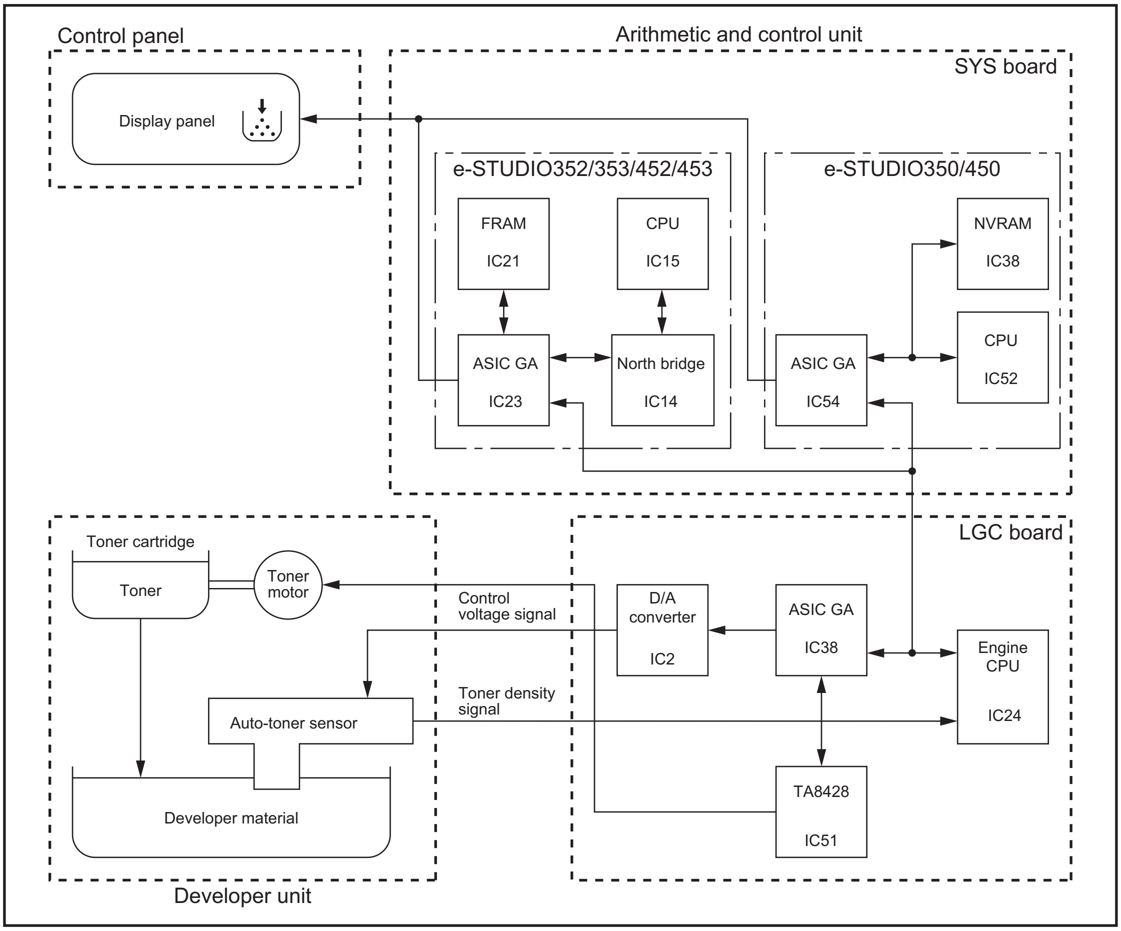

Control panel
Display panel
Arithmetic and control unit
SYS board
e-STUDIO352/353/452/453
FRAM
IC21
CPU
IC15
ASIC GA
IC23
North bridge
IC14
e-STUDIO350/450
NVRAM
IC38
ASIC GA
IC54
CPU
IC52
Toner cartridge
Toner
Toner motor
Control voltage signal
Auto-toner sensor
Toner density signal
Developer material
Developer unit
LGC board
D/A converter
IC2
ASIC GA
IC38
Engine CPU
IC24
TA8428
IC51

Fig. 12-401

12.4.2 Function of auto-toner sensor

(1) Function

a. Initialization adjustment function —At the first use of the equipment or when the developer material is replaced with a new one.

Automatically adjusts the output value of the auto-toner sensor responding to humidity (input value to the main CPU) for the toner density of the new developer material so that it stays in range of 2.35 to 2.45V.

b. Stabilizing the toner density —During the printing operation

Maintains the toner density to a certain ratio as follows.

Toner is consumed.
→The toner density is lowered.
→Change in the auto-toner sensor output responding to humidity is detected.
→The toner motor is driven.
→Toner is supplied from the toner cartridge to the developer unit.

c. Toner-empty detection and recovery:

Detects that there is no toner in the toner cartridge:

The toner motor is driven.
→The auto-toner sensor output does not change.
→The toner density does not change.
→It is determined there is no toner in the cartridge (toner empty).

Recovering from the toner-empty state:

The toner motor is driven.
→Toner is supplied from toner cartridge.
→The auto-toner sensor output changes.
→The toner density returns to normal value.
→The toner-empty state is cleared.

(2) Function of auto-toner sensor

The auto-toner sensor consists of the following circuits:

- Drive winding : A magnetic head (primary side) with a high-frequency magnetic field, which forms a magnetic circuit in the developer material.
- Detection winding : Receives the change in the magnetic resistance of the developer material through the magnetic circuit (secondary side).
- DC conversion circuit : Converts a high-frequency output from the detection winding into a DC signal (auto-toner output V_{ATS}).

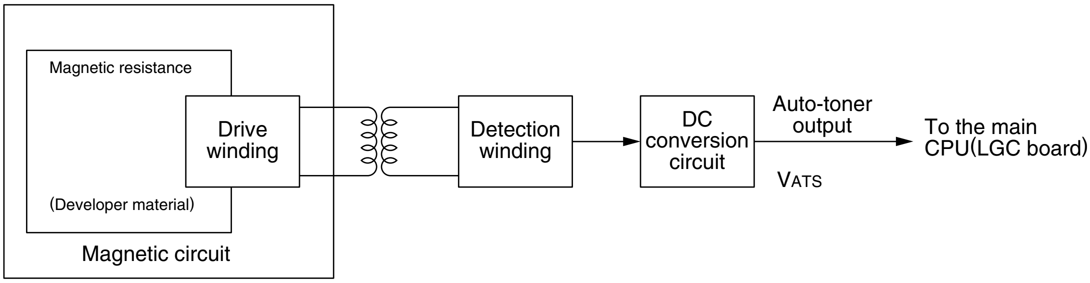

Magnetic resistance
Drive winding
(Developer material)
Magnetic circuit
Detection winding
DC conversion circuit
Auto-toner output
VATS
To the main CPU(LGC board)

Fig. 12-402

When the toner density is low—

The ratio of the toner against the carrier in the developer material decreases.
→The magnetic resistance decreases.
→The detection output increases.
→The auto-toner output V_{ATS} increases.

When the toner density is high—

The ratio of the toner against the carrier in the developer material increases.
→The magnetic resistance increases.
→The detection output decreases.
→The auto-toner output V_{ATS} decreases.

12.4.3 Adjustment using the temperature / humidity sensor

Variation in the output (V_{ATS}) of the auto-toner sensor due to humidity is corrected using the temperature / humidity sensor to maintain the toner density in the developer material at a certain amount.

12.4.4 Adjustment using the drum thermistor

Variation in the output (V_{ATS}) of the auto-toner sensor due to temperature is corrected using the drum thermistor to maintain the toner density in the developer material at a certain amount.

Feedback control by drum thermistor in setting mode (08)

Code	Item to be controlled	Default
08-840	Toner output control by drum thermistor	ON

12.5 Disassembly and Replacement

[A] Developer unit

(1) Open the front cover and remove the toner bag.

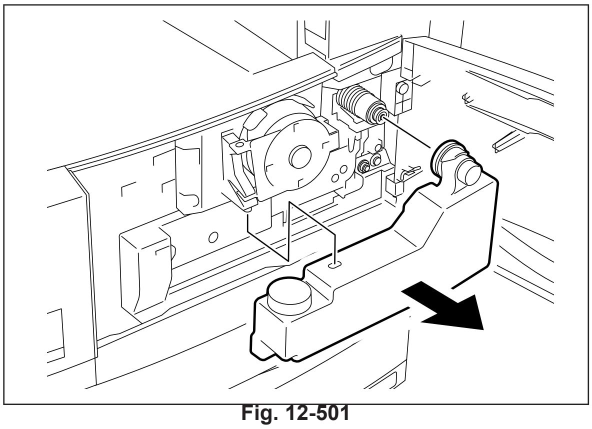


Fig. 12-501

(2) Disconnect 1 connector and loosen 1 screw.

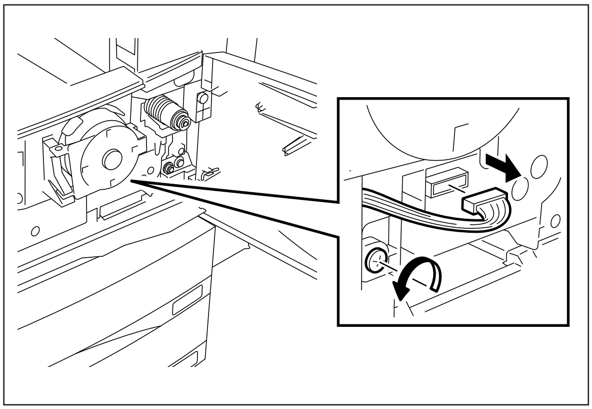


Fig. 12-502

(3) Take out the developer unit.

Note:

Do not touch the developer sleeve on the top of the developer unit.

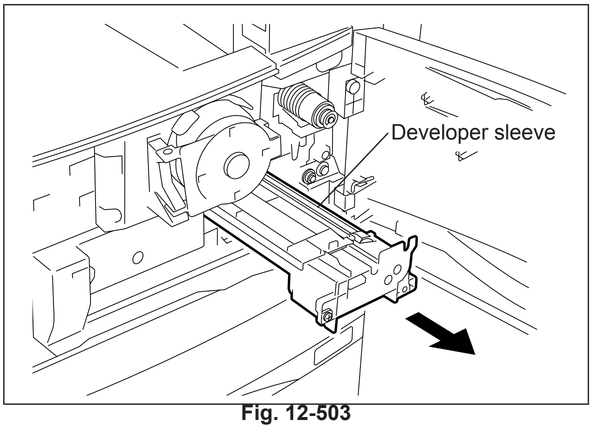


Fig. 12-503

[B] Developer material

(B-1) Discharge of developer material

(1) Slide the upper cover of developer unit to the direction of the arrow and take off the cover by releasing the latches.

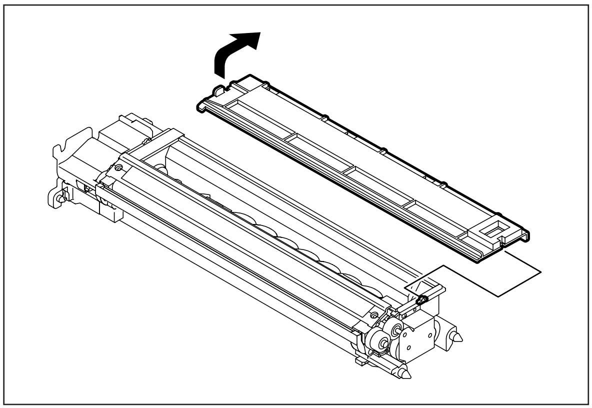


Fig. 12-504

(2) Incline the developer unit and discharge the developer material from the part denoted with the arrow.

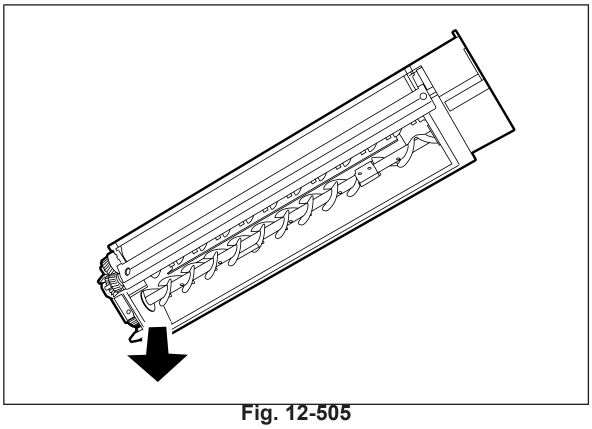


Fig. 12-505

(B-2) Filling developer unit with developer material

(1) Install the developer nozzle jig on the developer bottle.

(2) Rotate the gear on the rear side of the developer unit to the direction of the arrow while filling the developer unit with the developer material. Spread out the developer material over the developer sleeve.

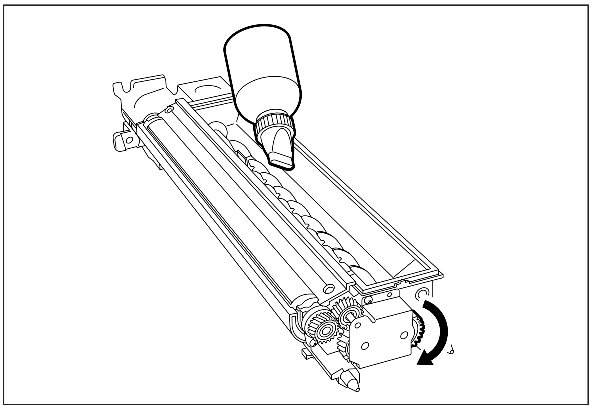


Fig. 12-506

Note:

When installing the upper cover of developer unit, attach the latches securely.

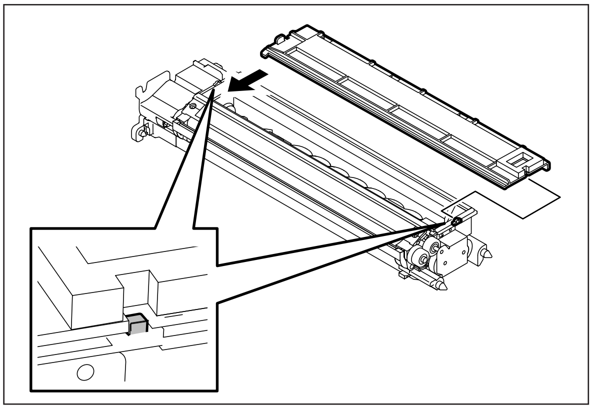


Fig. 12-507

[C] Guide roller

(C-1) Front side

(1) Discharge the developer material (► Chapter 12.5 (B-1)).

(2) Make a note of the position where the polarity adjustment lever is pointing. (Mark the position if needed.)

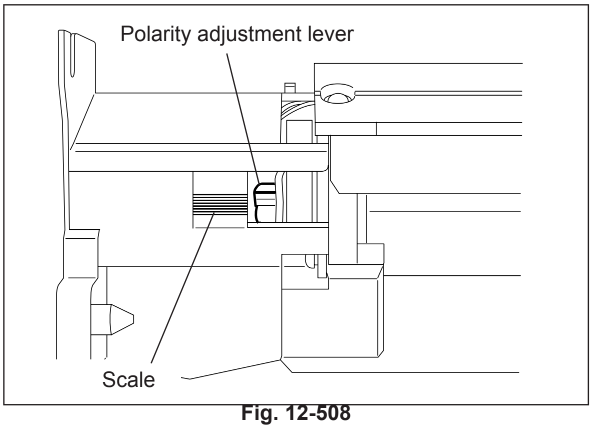


Fig. 12-508

(3) Remove 3 screws and take off the front cover of the developer unit.

(4) Disconnect 2 connectors.

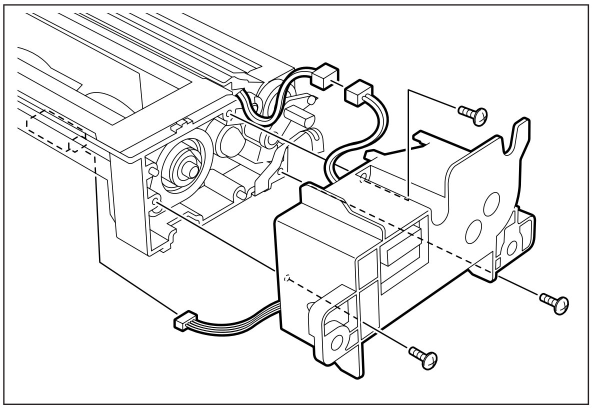


Fig. 12-509

(5) Remove 1 screw and take off the polarity adjustment lever.

(6) Remove 1 E-ring and take off the guide roller.

Note:

When reassembling, match the polarity adjustment lever with the previously marked position on the scale.

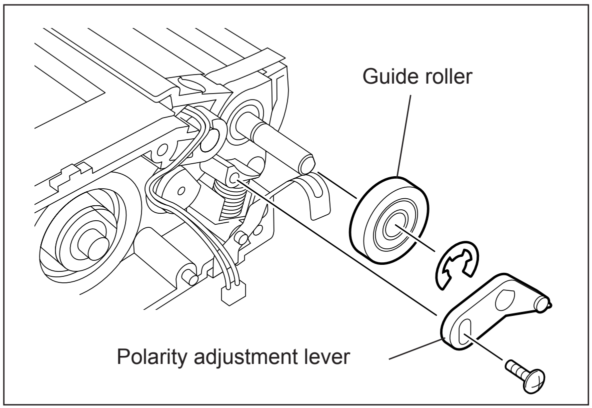


Fig. 12-510

(C-2) Rear side

(1) Remove 2 screws and take off the bracket.

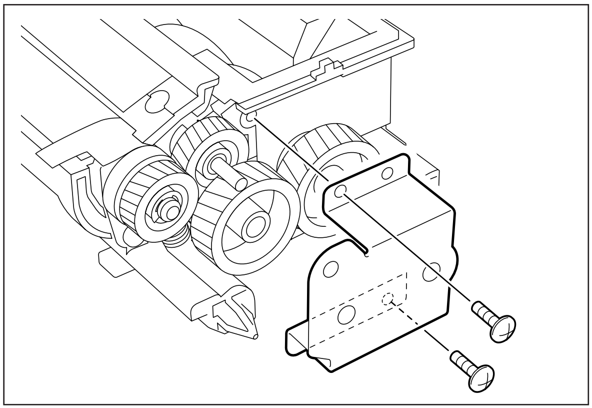


Fig. 12-511

(2) Remove 1 E-ring and 4 gears.

(3) Take off the guide roller.

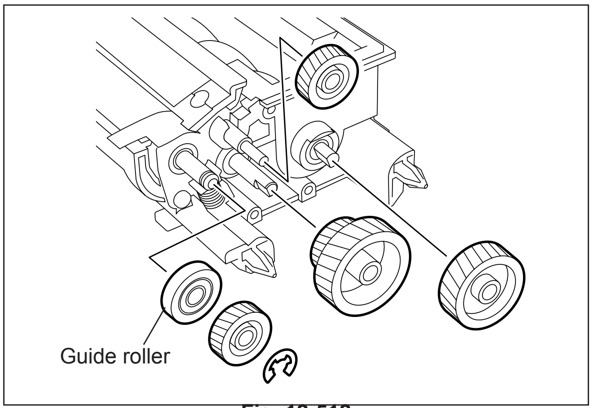


Fig. 12-512

[D] Auto-toner sensor

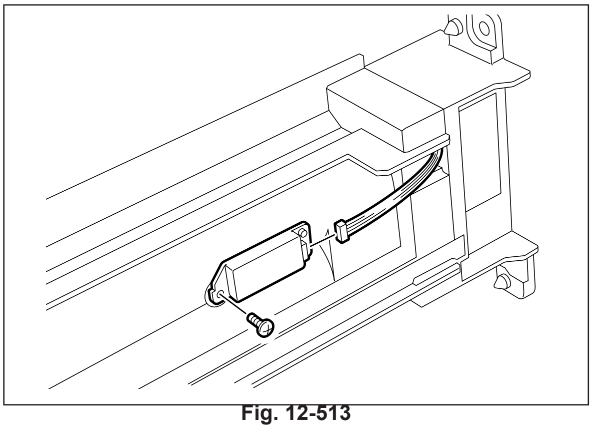


Fig. 12-513

(1) Discharge the developer material
(► Chapter 12.5 (B-1)).

(2) Disconnect 1 connector on the bottom of the developer unit.

(3) Remove 1 screw and take off the auto-toner sensor.

[E] Drum thermistor

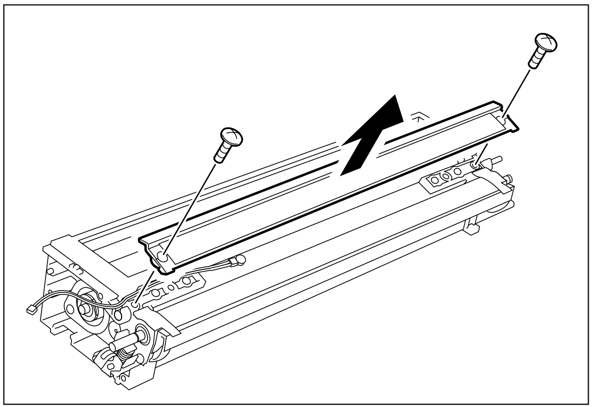


Fig. 12-514

(1) Discharge the developer material
(► Chapter 12.5 (B-1)).

(2) Take off the front cover of developer unit
(► Chapter 12.5 (C-1)).

(3) Remove 2 screws and take off the developer sleeve cover.

(4) Remove 1 screw and take off the drum thermistor.

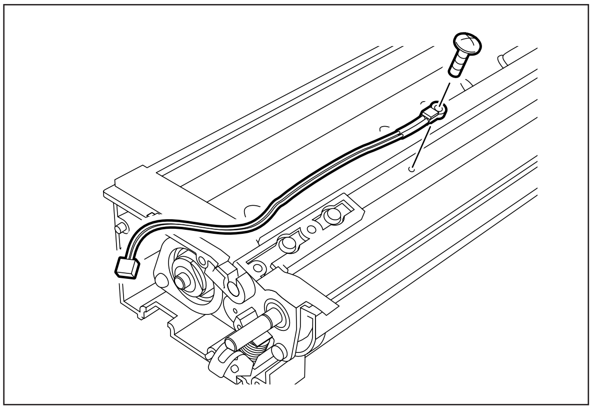


Fig. 12-515

[F] Developer sleeve

(1) Discharge the developer material (► Chapter 12.5 (B-1)).

(2) Take off the guide rollers (on both front and rear sides) (► Chapter 12.5 [C]).

(3) Take off the developer sleeve cover (► Chapter 12.5 [E]).

(4) Remove 2 screws. Lift up the shaft and take off the developer sleeve unit.

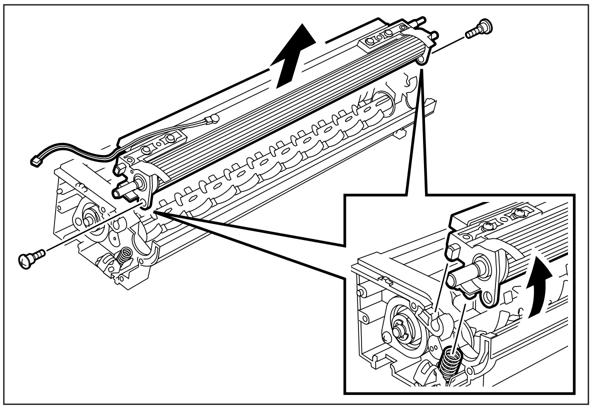


Fig. 12-516

(5) Remove 4 screws and doctor blade.

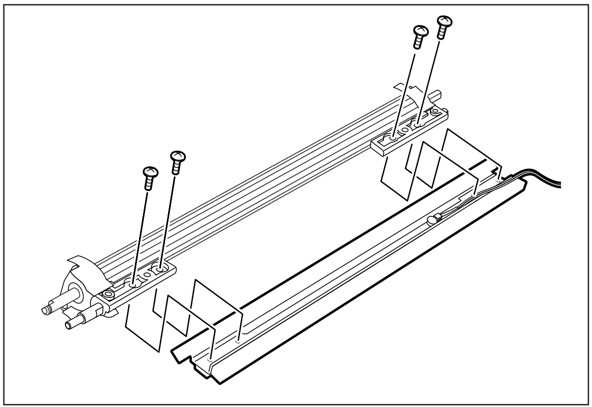


Fig. 12-517

(6) Take off the developer sleeve.

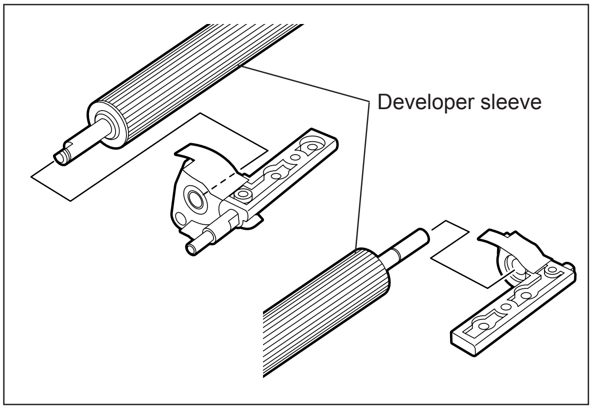


Fig. 12-518

(7) Replace the oil seal on the shaft on the developer sleeve rear side, if necessary.

*Replacement of Oil Seal (► Page 12-15)

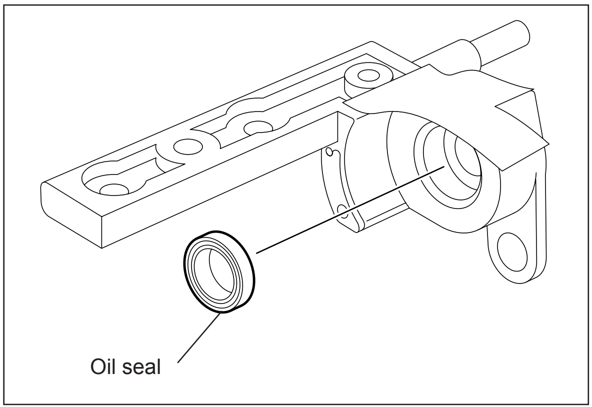


Fig. 12-519

Notes:

1. When installing the developer sleeve unit, make sure that the side seals (urethane seal) of the front and rear sides do not come out of the case.
2. When installing the doctor blade, make the gap adjustment of the doctor sleeve.

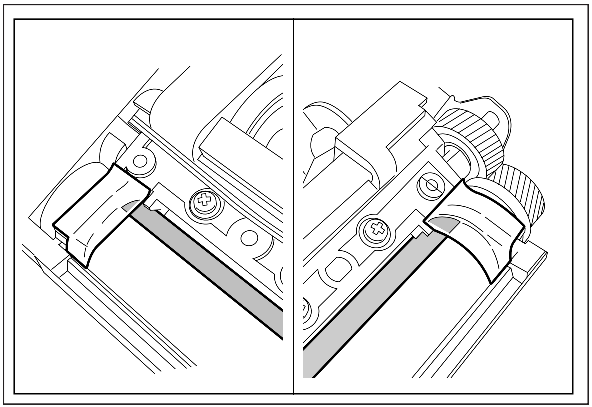


Fig. 12-520

[G] Mixer-1

(1) Discharge the developer material (► Chapter 12.5 (B-1)).

(2) Take off the developer sleeve unit (► Chapter 12.5 [F]).

(3) Take off the bushing on the front side.

*Replacement of Oil Seal (► Page 12-15)

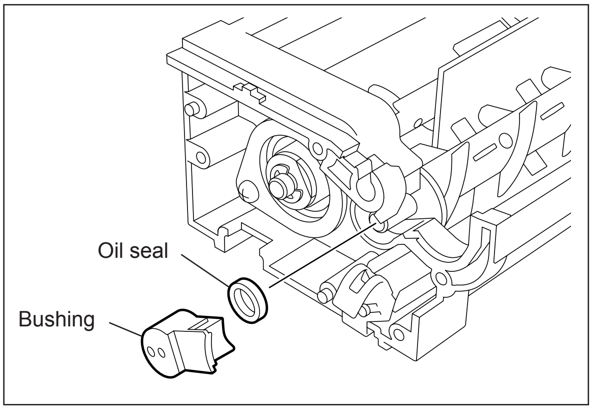


Fig. 12-521

(4) Remove 1 E-ring and 1 bushing. Then take off the mixer-1.

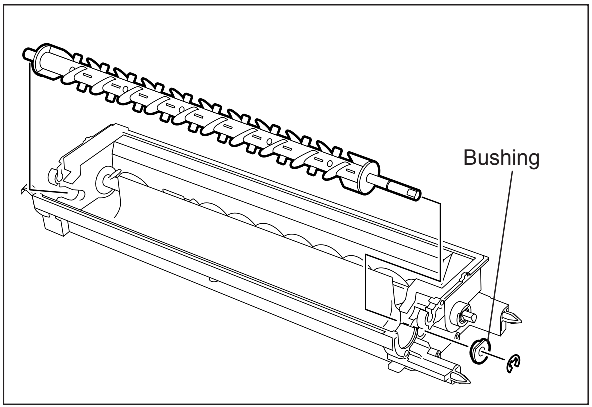


Fig. 12-522

[H] Mixer-2

(1) Discharge the developer material (► Chapter 12.5 (B-1)).

(2) Take off the developer sleeve unit (► Chapter 12.5 [F]).

(3) Remove 1 E-ring and 1 bushing on the front side.

(4) Remove 1 screw and holder.

*Replacement of Oil Seal (► Page 12-15)

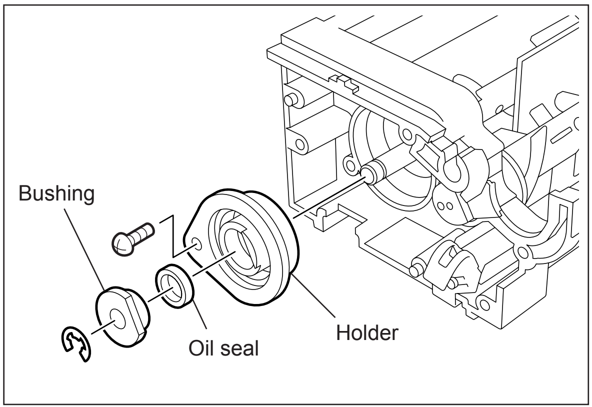


Fig. 12-523

(5) Remove 1 bearing on the rear side and take off the mixer-2.

*Replacement of Oil Seal (► Page 12-15)

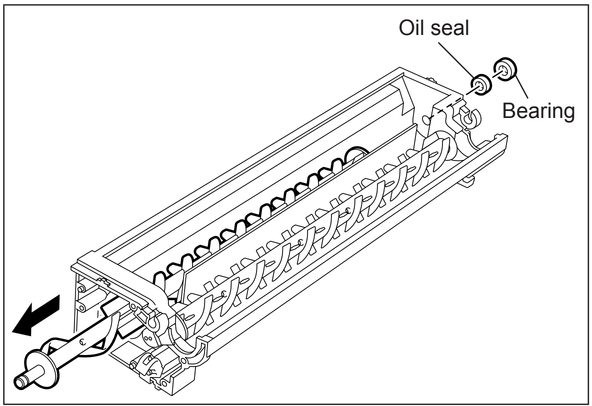


Fig. 12-524

[I] Toner cartridge drive unit

(I-1) Toner cartridge drive unit

(1) Take off the toner cartridge.

(2) Take off the developer unit (► Chapter 12.5 [A]).

(3) Take off the receiving tray (► Chapter 2.5.1[H]).

(4) Take off the tray back cover (► Chapter 2.5.1 [I]).

(5) Disconnect 1 connector and remove 1 harness clamp.

(6) Remove 3 screws and take off the toner cartridge cover.

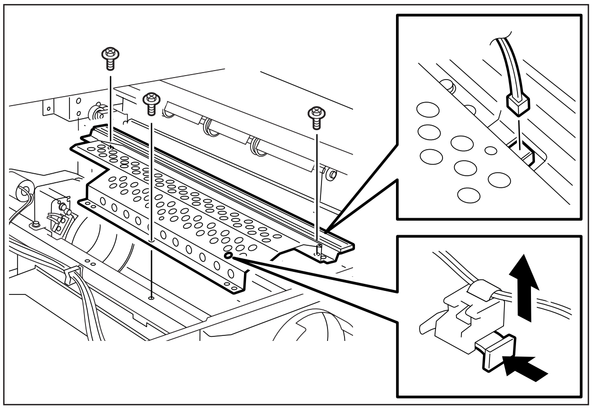


Fig. 12-525

(7) Remove 2 screws and disconnect 2 connectors. Then take off the toner cartridge drive unit.

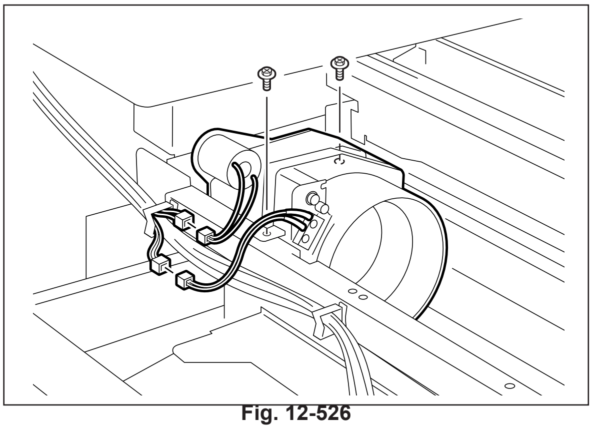


Fig. 12-526

(I-2) Toner motor

(1) Take off the toner cartridge drive unit (► Chapter 12.5 (I-1)).

(2) Remove 2 screws and take off the toner motor.

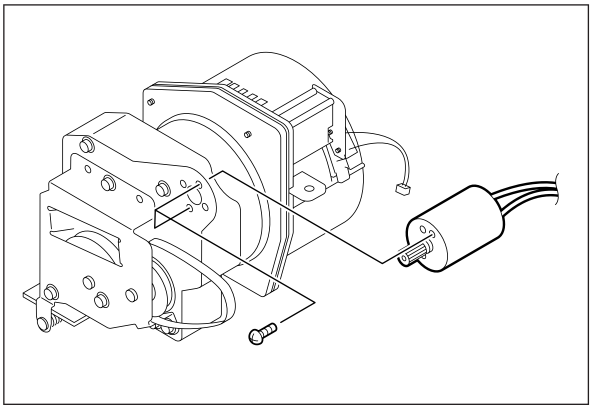


Fig. 12-527

(I-3) Toner cartridge detection switch

(1) Take off the toner cartridge drive unit (► Chapter 12.5 (I-1)).

(2) Remove 1 screw and take off the toner cartridge detection switch with the whole bracket.

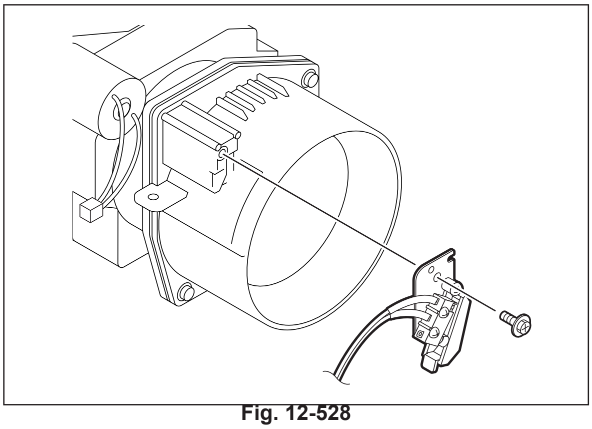


Fig. 12-528

(3) Remove 3 screws with a fine screwdriver and take off the toner cartridge detection switch and switch cover.

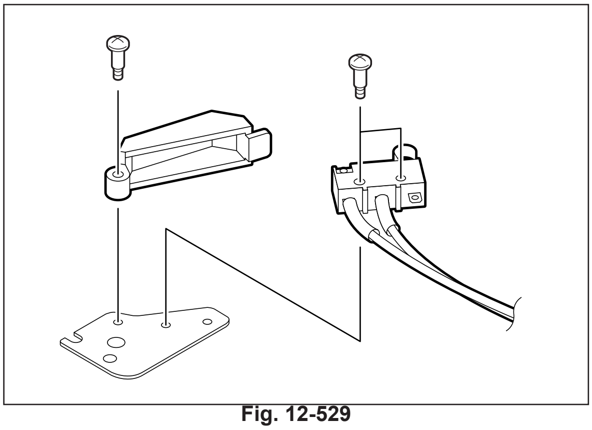


Fig. 12-529

<< Replacement of Oil Seal>>

1. Insert a fine screwdriver into the depression of the oil seal to take it out.
2. Push in a new oil seal parallel to the frame or bushing (shown figure at right).
3. Apply the grease (Alvania No.2; amount of 2 rice grains) on entire surface of the oil seal evenly.

Note:

Wipe off the excessive grease.

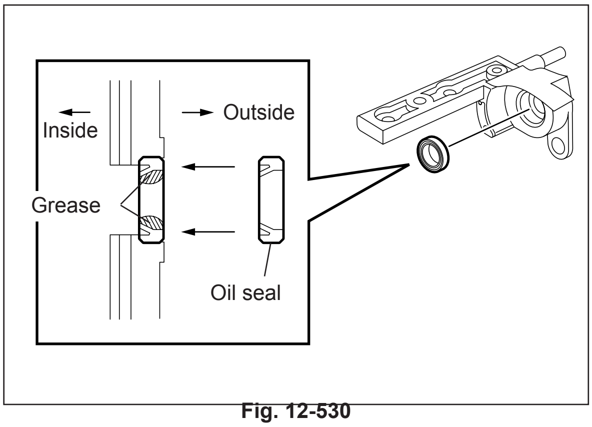


Fig. 12-530

13. FUSER UNIT / PAPER EXIT SECTION

13.1 General Description

Toner is fused by applying heat and pressure on the transferred image on the paper which is transported to the fuser unit. The paper is then transported to the receiving tray, paper exiting options or ADU. The fuser unit consists of the IH coil, fuser roller, pressure roller, separation fingers, cleaning roller, thermistors, thermostat, exit roller, exit sensor, etc.

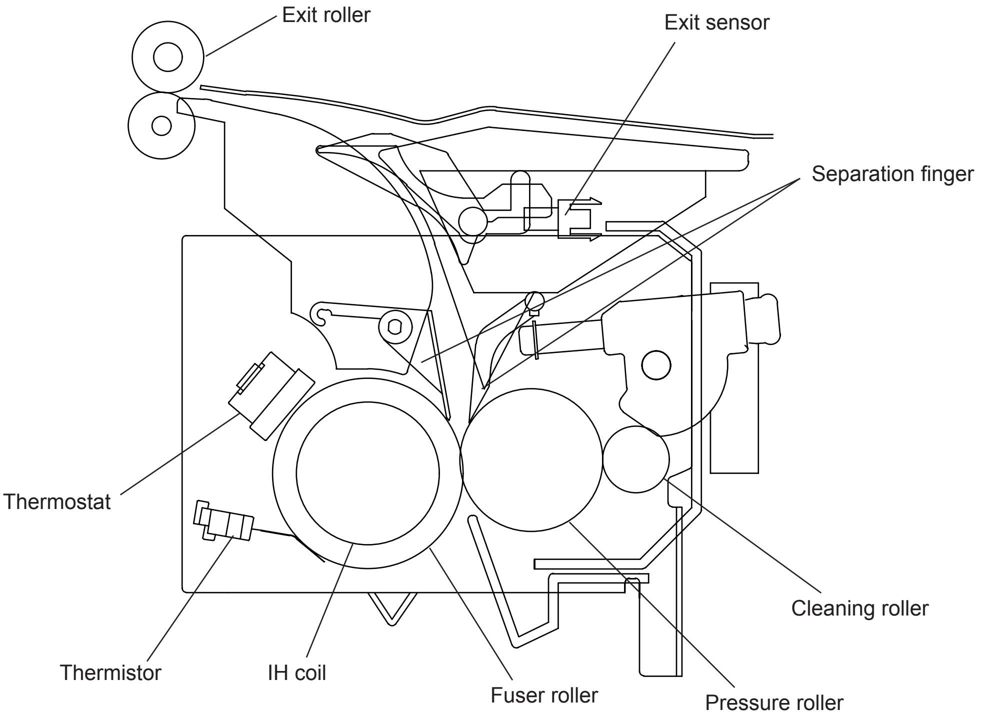


Fig. 13-101

13.2 Operation

The fuser roller is pressed with the spring force from the pressure roller side, and is rotated by the main motor drive. Then the paper transported to the fuser unit is hold between the fuser roller and pressure roller and the toner is fused on the paper with heat and pressure. After this, the separation fingers separate the paper from the fuser roller or pressure roller. Then the paper is transported to the receiving tray, paper exiting options or ADU through the exit roller. In addition, the IH coil in the fuser roller does not structurally rotate.

The thermistors control the temperature of fuser roller and detect temperature abnormalities. If the temperature becomes excessively high, the thermostat is opened to stop the power supply to the IH coil.

13.3 Functions

(1) IH coil (IH: Induction Heating)

The IH coil is inside the fuser roller and applies the induction heating to the fuser roller. The coil is fixed at a position and does not move when the fuser roller is rotating.

(2) Fuser roller

The fuser roller is a metal roller which generates heat spontaneously with eddy current produced by the electromagnetic induction of IH coil. The fuser roller is heated by this self-heating of this roller, and then the toner is fused on the paper.

(3) Pressure roller

The pressure roller is a sponge roller which assures the nip amount between the fuser roller. The pressure arm and spring press the fuser roller.

The toner is fused effectively by the pressure of this roller.

(4) Separation fingers

The separation fingers are installed, five above the pressure roller and six above the fuser roller, in order to separate the paper adhered on each roller.

(5) Cleaning roller

The cleaning roller is a fluorinated metal roller which removes the residual toner and paper dust adhered on the pressure roller.

(6) Main thermistor

This thermistor detects the temperature of the fuser roller to maintain it in a certain temperature range (actually around 200°C) between the lower limit causing the poor fusing and the upper limit causing the high temperature offsetting. When the temperature of the fuser roller is lower than the preset temperature, it turns ON the power supply to the IH coil, and when it is higher than the preset temperature, it cuts off the supply.

(7) Edge thermistor

It detects the temperature abnormality at the both ends of the fuser roller. This area may be overheated without heat absorption by paper since paper does not pass through this area. This thermistor is not related to the temperature control of the fuser roller.

(8) Thermostat

The thermostat cuts off the power supply to the IH coil by opening itself if the fuser roller becomes abnormally hot as a result of the problem such as thermistor malfunction. The thermostat for this equipment is used to prevent abnormal operation. When the thermostat detects any abnormality, it must be replaced as well as the other damaged parts in the fuser unit.

(9) Exit sensor

This sensor detects the arrival of the leading or trailing edge of the paper at the exit roller of the fuser unit. It also detects paper jams in the fuser unit paper exit area and trailing edge of paper turned over for duplex printing.

(10) Exit motor

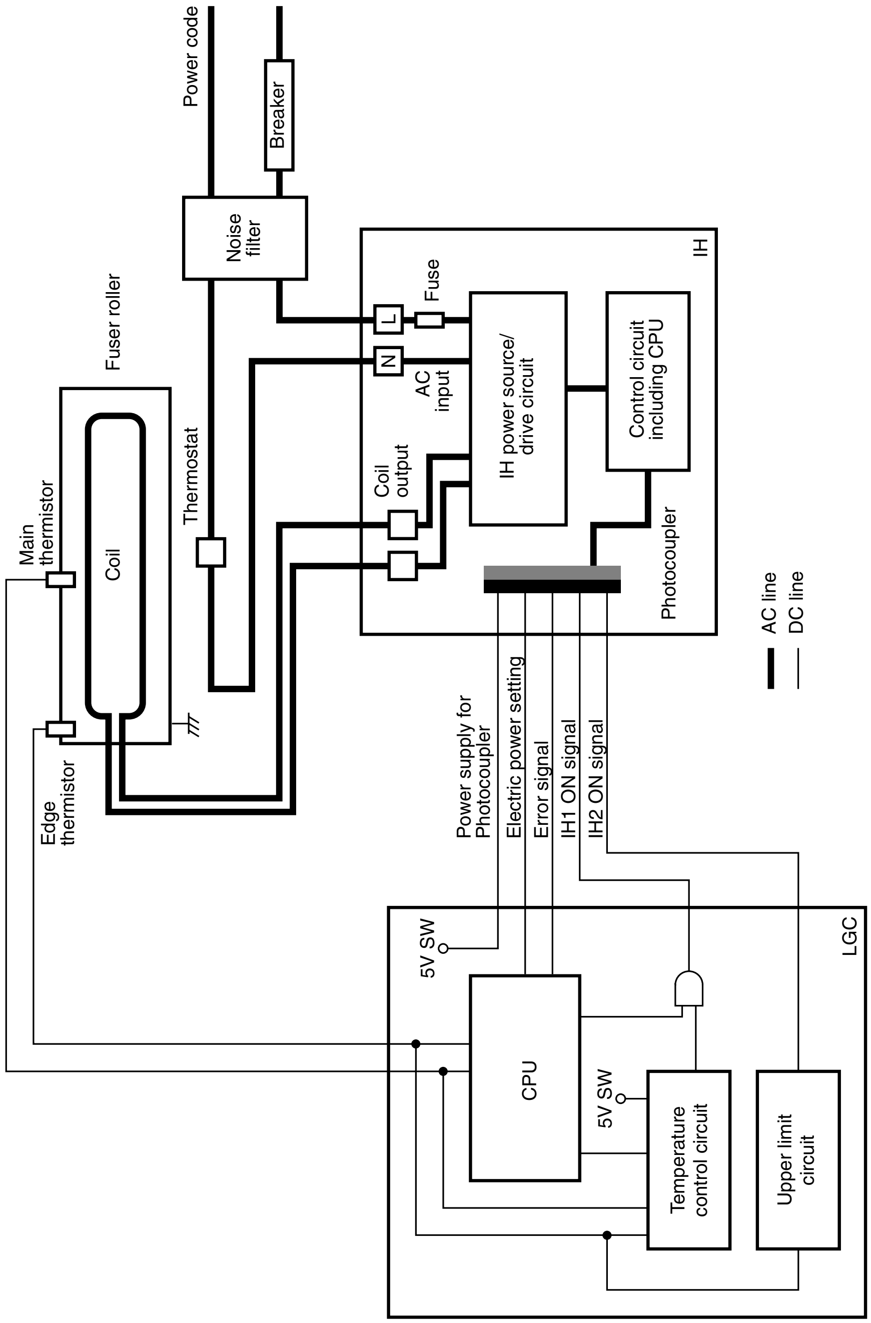
The exit motor is a stepping motor which drives the exit roller and bridge unit.

(11) Exit roller

This roller transports the paper from the fusing section to the receiving tray, paper exiting options or the ADU and is driven by the exit motor.

13.4 Heater Control Circuit

13.4.1 Configuration

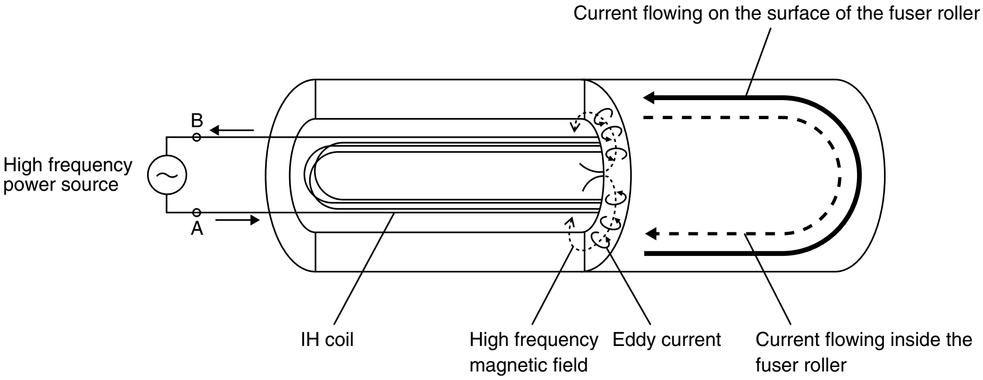

Power code
Breaker
Noise filter
IH
Fuse
L
N
AC input
IH power source/ drive circuit
Control circuit including CPU
Coil output
Photocoupler
Fuser roller
Thermostat
Main thermistor
Coil
Edge thermistor
AC line
DC line
Power supply for Photocoupler
Electric power setting
Error signal
IH1 ON signal
IH2 ON signal
LGC
5V SW
CPU
5V SW
Temperature control circuit
Upper limit circuit

[Block diagram of fuser unit and IH control circuit]

Fig. 13-401

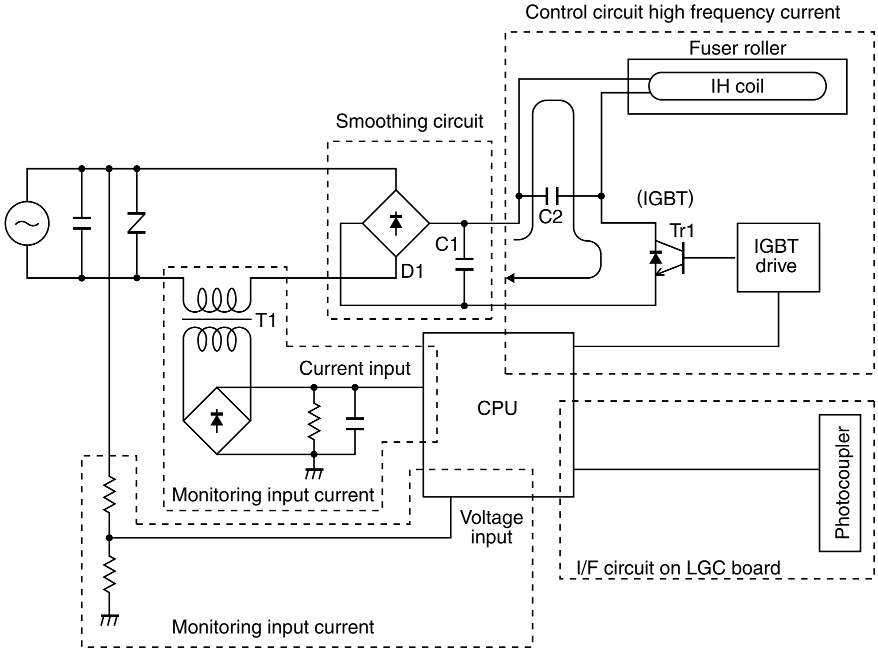
13.4.2 Heating principle of IH Heater

The magnetic field is generated by applying a high frequency current to the IH coil inside the fuser roller, which then generates the eddy current in it. When the eddy current flows, the Joule heat is generated by the resistance element of the fuser roller, which is then heated. In the IH coil method, the thermal efficiency is higher than the lamp method because the fuser roller is directly heated.


Current flowing on the surface of the fuser roller
B
High frequency power source
A
IH coil
High frequency magnetic field
Eddy current
Current flowing inside the fuser roller

[Image of current flowing from A to B]

Fig. 13-402


Control circuit high frequency current
Fuser roller
IH coil
Smoothing circuit
C2
(IGBT)
Tr1
IGBT drive
C1
D1
T1
Current input
CPU
Photocoupler
Monitoring input current
Voltage input
I/F circuit on LGC board
Monitoring input current

[Block diagram of high frequency power supply]

Fig. 13-403

13.4.3 IH control circuit interface

The IH control circuit uses a photocoupler as an insulation against the secondary circuit.

The interface signals are as follows.

CN No.	Name of signal	Direction	Definition
CN455-1	IH2 ON	LGC to IH	IH coil energization permitting signal
CN455-2	VDD		Switching signal of power setting
CN455-3	H1PWR1		
CN455-4	H1PWR2		
CN455-5	H1PWR3		
CN455-6	H2PWR1		
CN455-7	H2PWR2		
CN455-8	H2PWR3		
CN456-1	IH1 ON	LGC to IH	IH coil energization permitting signal
CN456-2	SG		
CN456-3	NC	-	Not connected
CN456-4	H1ERR1	IH to LGC	IH status signal (*Note)
CN456-5	H1ERR2		

(*Note) IH status signal

- When the temperature (due to insufficient cooling) of the switching element (IGBT) is abnormal: “10: Coil is abnormal, IH FAN OFF” → After a certain period of time → Error [C480]
- When the upper limit of the power voltage is abnormal: “00: Initializing” → After a certain period of time → Error [C470]
- When the lower limit of the power voltage is abnormal: “00: Initializing” → After a certain period of time → Error [C470]
- Defective circuits → : “11: Abnormal circuit, IH coil abnormality” → Error [C490]
- Ready state after the initialization: “01: Ready”

13.4.4 Relation between system configuration and IH output

e-STUDIO350/450

System configuration	Warming up (*2)	Ready	Printing	Energy Saving Mode	Automatically OFF
Equipment only	1240-1200W	700W	980W	OFF	OFF
Equipment and RADF (*1)					
Equipment, RADF (*1) and FIN	1220-1140W				
Equipment, RADF (*1), FIN, and HPU					
Equipment, RADF (*1), FIN, HPU and LCF	1160-1080W				
Equipment, RADF (*1), FIN, HPU, LCF and FAX					

e-STUDIO352/353/452/453

System configuration	Warming up (*2)	Ready	Printing	Energy Saving Mode	Automatically OFF
Equipment only	1300-1200W	700W	980W	OFF	OFF
Equipment and RADF (*1)					
Equipment, RADF (*1) and FIN	1280-1180W				
Equipment, RADF (*1), FIN, and HPU					
Equipment, RADF (*1), FIN, HPU and LCF	1260-1160W				
Equipment, RADF (*1), FIN, HPU, LCF and FAX					

* RADF: Reversing Automatic Document Feeder, FIN: Finisher, HPU: Hole Punch Unit, LCF: Large Capacity Feeder, FAX: FAX unit

(*1) The wattage lowers 50 W more when the scanning is performed from the RADF during warming up.

(*2) AC power should be input voltage when the equipment is warming up (The lower the voltage is, the longer the warming up time becomes).

13.4.5 Temperature detection section

To maintain the stable temperature of the fuser belt, the thermistor detects the temperature and controls ON/OFF of the IH coil. Output from the thermistors is used to detect the abnormality.

(1) Relation between the thermistor output voltage and surface temperature of the fuser belt

Output voltages of thermistors [V]	Surface temperatures of fuser belt [°C]
Approx. 0.5	40
Approx. 2.0	100
Approx. 3.5	160
Approx. 4.0	200

(2) Control of the surface temperature of the fuser belt

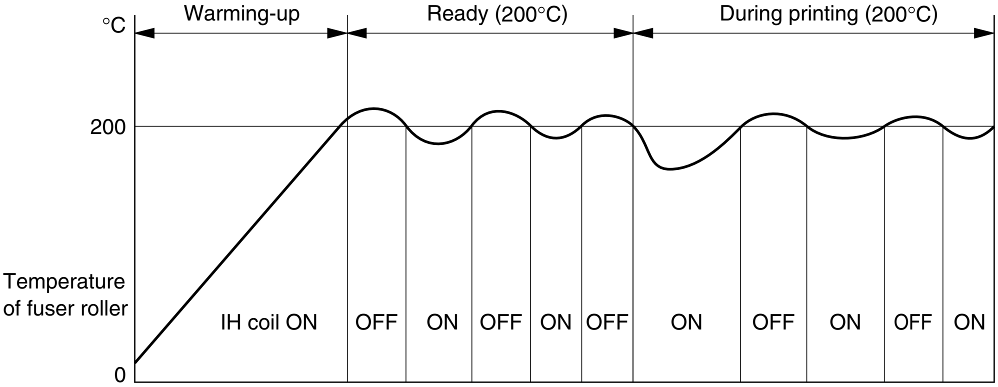


Fig. 13-404

(3) Temperature control for the both ends of the fuser roller

During the continuous printing, the temperature of the both ends of the fuser belt (areas where the paper does not pass on) generally tend to be higher than that of the other areas (areas where the paper passes on). The temperature of the ends are detected by the front edge thermistor, and when it reaches 280°C, the heater is automatically turned OFF regardless of the temperature of the area where the paper passes on.

(4) Temperature control at Energy Saving Mode

This equipment has the following two types of temperature control for saving energy and returns to ready status to perform printing in each mode upon printing request.

The period of time from the printing request to this mode can be set in “Setting Mode (08)” or by an administrator.

Administrator setting procedure:

[USER FUNCTIONS] button → [ADMIN] (input of administrator’s password) → [GENERAL] → [ENERGY SAVER]

Auto Power Save Mode (Setting Mode (08-205)):

When the printing is not performed in a specified period of time (default setting: 15 min.) after the previous printing is completed, the equipment enters to Auto Power Save Mode to turn OFF the IH coil.

Auto Shut Off Mode (Setting Mode (08-206)):

When the printing is not performed in a specified period of time (default setting: 60 min (e-STUDIO350), 90 min (e-STUDIO450)). after the equipment entered to Auto Power Save Mode, the equipment then enters to Auto Shut Off Mode to turn OFF the IH coil.

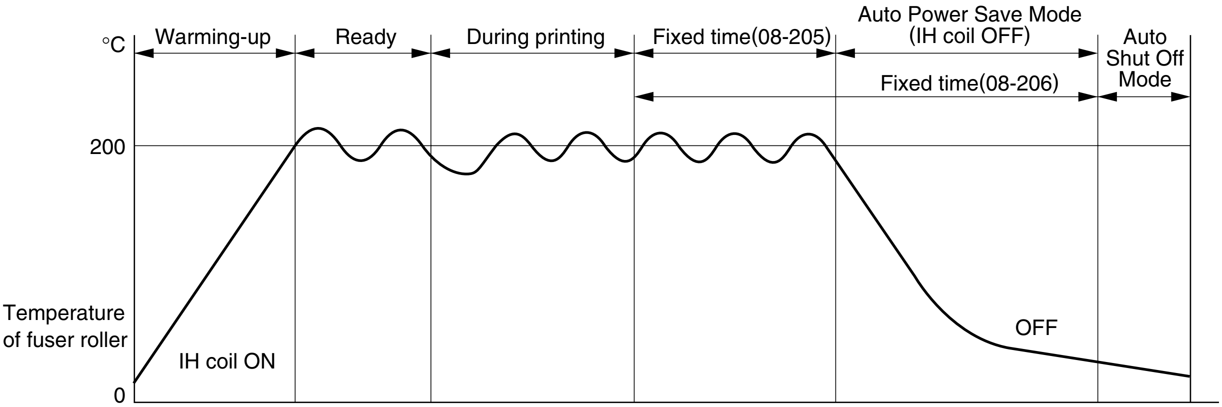


Fig. 13-405

(5) Thermistor/Heater status counter control

- To enhance the safety of the fusing section unit, CPU provides the following protection: When the third [C410] error has occurred after two consecutive [C410] errors, the IH coil is not turned ON and error [C410] is displayed immediately even if an operator turns OFF the power and back ON.
  However, if the equipment goes into a ready state normally with the thermistor/heater status counter “1” or below, the counter is cleared to “0”.
- If the error codes [C410] to [C450] are displayed and still not cleared even though the thermistor, thermostat and IH coil have been repaired (and the power ON/OFF does not clear the er-

Reference

*The thermistor/heater status counter never has values other than 0-18.

- If the IH coil does not turn ON and the service call [C410] is displayed immediately after the power is ON, ensure the thermistor/heater status counter is “2” or over. If it is “2” or over, be sure to check the thermistor, thermostat and IH coil. Reset the counter to “0” (Setting Mode (08-400)) after repairing them, then turn ON the power.
- If the thermistor/heater status counter is “19” or over (e.g., 21), the data in NVRAM or NVRAM itself may possibly have been ruined due to causes such as leakage from the chargers. Check the bias, high-voltage transformers and charge wires to see if any of them is defective, and also look through all the data in the NVRAM.
- When the thermistors detect overheating, the CPU decides the error code and counter value of the fuser roller thermistor status. After turning OFF each output (the IH coil, exposure lamp, control panel display, motors and so on), the CPU turns OFF the power to protect the fuser unit.

  Error code: C440 ([C] and [8])
  Counter value of the fuser roller thermistor status: 9 (08-400)

  Thermistors continue detecting the abnormal temperature even after the error codes and counter values are decided. Even if the power is turned ON immediately, it is automatically turned OFF again when the surface temperature of the fuser roller is still higher than the abnormal temperature detected.
  Wait until the surface temperature of the fuser roller is lowered enough, and turn ON the power to check the counter value while it is turned OFF again. After confirming that it is the IH control abnormality, correct the abnormality and clear the counter value (08-400) to "0" to start up the equipment normally.

(6) Temperature detection configuration

Thermistor is a device whose resistance decreases as it detects a higher temperature. Thus its input voltage to CPU changes and then CPU judges whether this change is normal or abnormal. If one of the fuser roller thermistors is broken, the control circuit judges that the fuser roller temperature is extremely low and keeps turning the IH coil ON. As a result, the fuser roller temperature rises, and possibly activates the thermostat which is a safety protection device. To prevent this in advance, CPU works to detect whether each thermistor is broken or not.

Also, the thermistors constantly check the temperature of IH coil to prevent it from excessive heating by IH circuit abnormality, LGC circuit abnormality or thermistor abnormality. The thermistors automatically turn OFF the power when the temperature of IH coil exceeds the specified temperature.

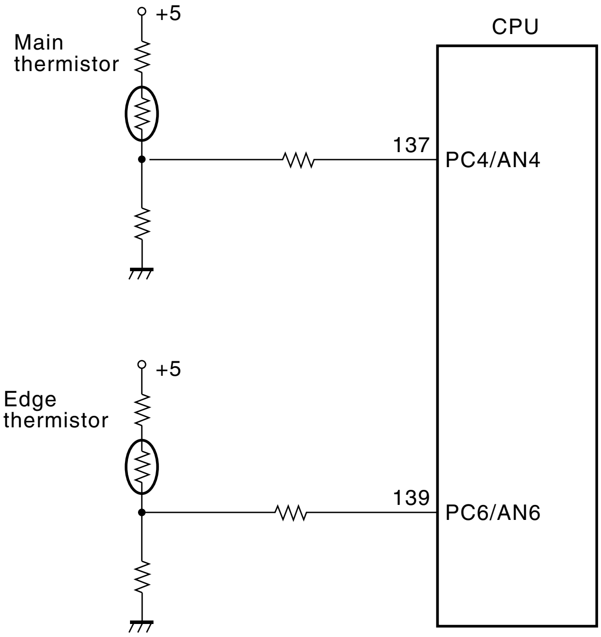


Fig. 13-406

(7) Abnormality detection by the thermistors

The following table shows the conditions judging the fuser belt temperature abnormality and detecting timing.

Checking timing	Condition	Temperature judged		Checking timing	Error code
		Main thermistor	Front edge thermistor		
Power ON	1	230°C or above	280°C or above	Power ON	C440
		-	-		
Detecting 40°C	1	230°C or above	280°C or above	Fixed time	C440
		-	-		
	2	40°C or below	-		C410
		-	-		
Detecting 100°C	1	230°C or above	280°C or above	Fixed time	C440
		-	-		
		100°C or below	-		
		-	-		
Detecting 160°C	1	230°C or abov e	280°C or above	Fixed time	C440
		-	-		
		160°C or below	-		
			-		
Detecting ready temperature	1	230°C or above	280°C or above	Fixed time	C440
		-	-		
		Ready temp. or below	-		
		-	-		
During ready status At Energy Saving Mode	1	230°C or above	280°C or above	On usual	C440
		-	-		
		40°C or below	-		
		-	-		
During printing	1	230°C or above	280°C or above	On usual	C440
		-	-		
		40°C or below	-		
		-	-		
	2	-	-		C450
At paper jam	1	230°C or above	40°C or below	On usual	C440
			-		

* The figures in the “condition” section denote the priority of error checking.

13.4.6 Abnormality in the IH control circuit

When an abnormality is detected in the IH control circuit, it stops the power supply to the IH coil and displays a message “call for service”.

(1) IH control circuit

CPU output level of the IH control circuit changes depending on the condition of IH coil. This output level goes through the photocoupler into the gate array.

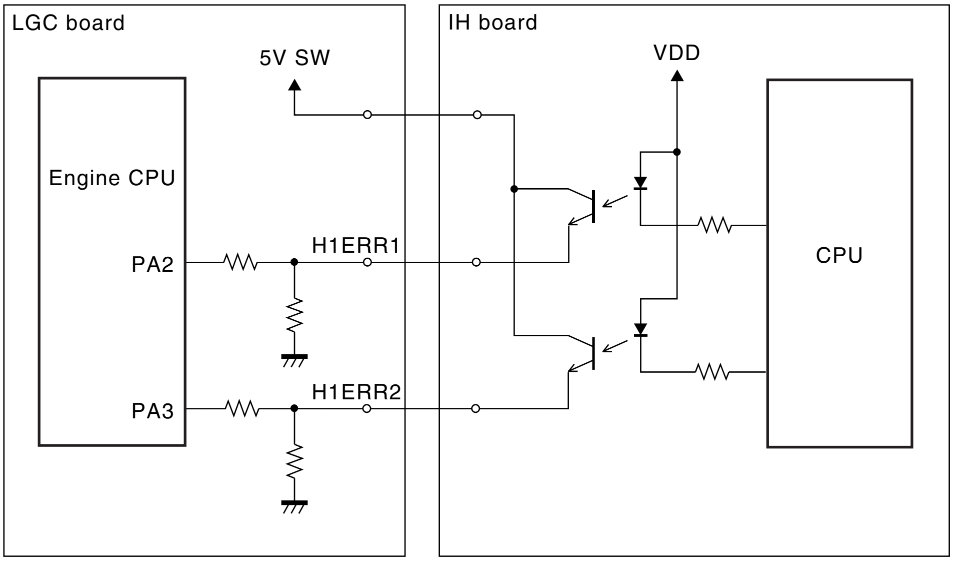

LGC board
5V SW
Engine CPU
PA2
H1ERR1
PA3
H1ERR2
IH board
VDD
CPU

Fig. 13-407

(2) IH error

Checking timing	Error content	Port input value		Error code	Counter
		H1ERR1	H1ERR2		
Power ON	Initial abnormality	L	L	C470	10
In warming up	IH power voltage abnormality	L	L	C470	11
Detecting 40°C	IGBT high temperature abnormality Continuous energization (15 sec.)	L	H	C480	12
	IH circuit/coil abnormality	H	H	C490	13
In warming up Detecting 40°C During ready status	IH power voltage abnormality	L	L	C470	14
	IGBT high temperature abnormality Continuous energization (15 sec.)	L	H	C480	15
	IH circuit/coil abnormality	H	H	C490	16
During ready status During printing At Energy Saving Mode	IH power voltage abnormality	L	L	C470	17
	IGBT high temperature abnormality Continuous energization (15 sec.)	L	H	C480	18
	IH circuit/coil abnormality	H	H	C490	19
	Normal	H	L	-	-

(2) IH error

Initial abnormality:

CPU (IH) abnormality is not cleared.

IH power voltage abnormality:

The input voltage becomes above 20% (approx.) or below 20% (approx.) of the rated voltage.

IGBT high temperature abnormality:

Overheating of IGBT or short- or open-circuit of IGBT temperature-detecting sensor.

IH circuit abnormality:

Abnormality in IH circuit

IH coil abnormality:

Temperature-detecting sensor in IH circuit is abnormal, or IH coil is open-circuited or wrongly installed.

13.5 Control Circuit of Exit Motor

The following is the control circuit of the exit motor.

The exit motor is a stepping motor. The motor is turned ON/OFF and the direction of its rotation is switched by controlling the output timing of pulse signal (A0·A1·B0·B1).

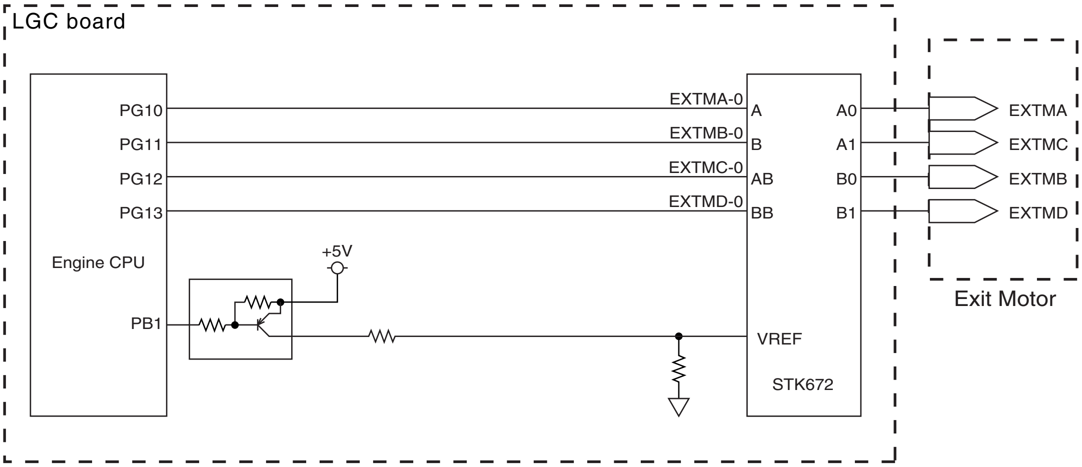

LGC board
PG10
PG11
PG12
PG13
Engine CPU
PB1
+5V
EXTMA-0
EXTMB-0
EXTMC-0
EXTMD-0
A
B
AB
BB
A0
A1
B0
B1
VREF
STK672
EXTMA
EXTMC
EXTMB
EXTMD
Exit Motor

Fig. 13-501

13.6 Exit Motor Drive

The diagram shown below is the layout of the driving gears of the exit roller.

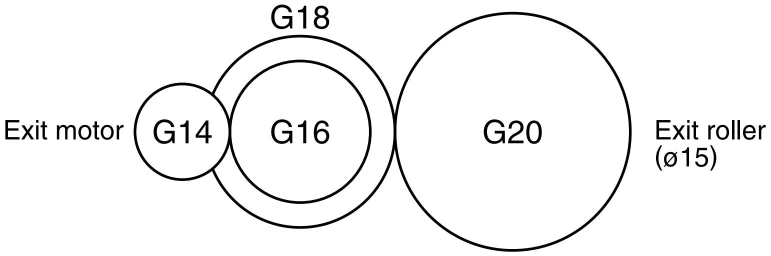

G18
Exit motor
G14
G16
G20
Exit roller
(ø15)

Fig. 13-601

13.7 Disassembly and Replacement

[A] Fuser unit PM

(1) Take off the IH terminal cover (► Chapter 2.5.1 [L]).

(2) Open the jam access cover and fuser unit cover. Disconnect 1 connector with lock, 2 faston terminals and 2 joint connectors.

(3) Release the harness from 1 harness clamp.

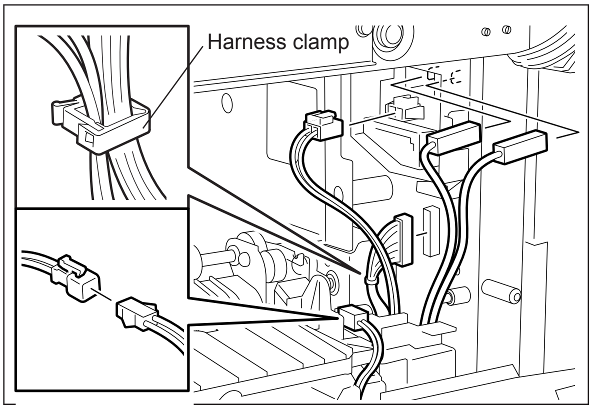


Fig. 13-701

(4) Close the fuser unit cover.

(5) Remove 2 screws and take off the fuser unit.

Notes:

1. Make sure to hold the plastic part of the faston terminals when disconnecting them.
2. Be careful not to connect each terminal to the wrong position.

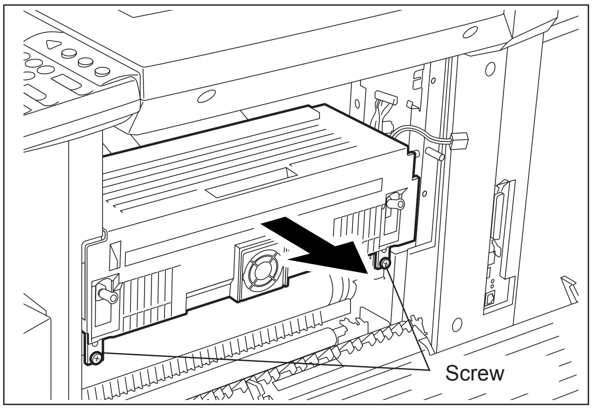


Fig. 13-702

[B] Fuser unit cooling fan

(1) Take off the fuser unit (► Chapter 13.7 [A]).

(2) Take off the fuser unit cover by pushing it to the right.

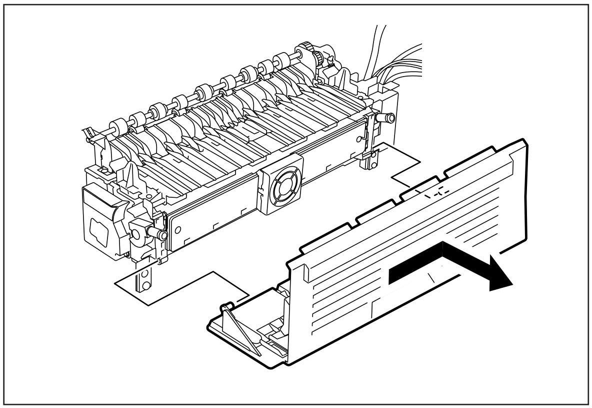


Fig. 13-703

(3) Remove 2 screws and take off the fuser unit cooling fan unit.

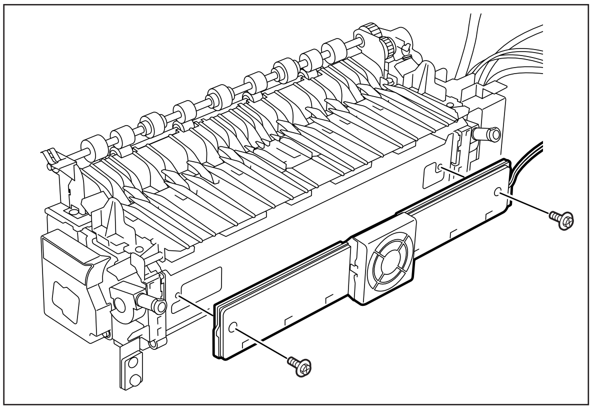


Fig. 13-704

(4) Release 2 latches of the fan cover and take off the fan cover.

(5) Release the harness from the guide of the cover.

(6) Remove 4 screws and take off the fuser unit cooling fan.

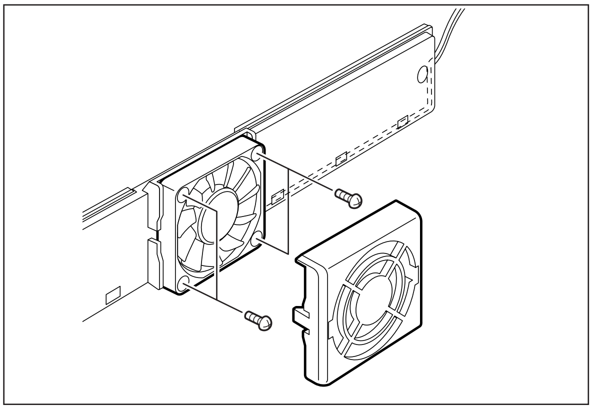


Fig. 13-705

[C] Exit sensor

(1) Take off the fuser unit (► Chapter 13.7 [A]).

(2) Release 2 latches of the exit sensor cover and take off the exit sensor cover.

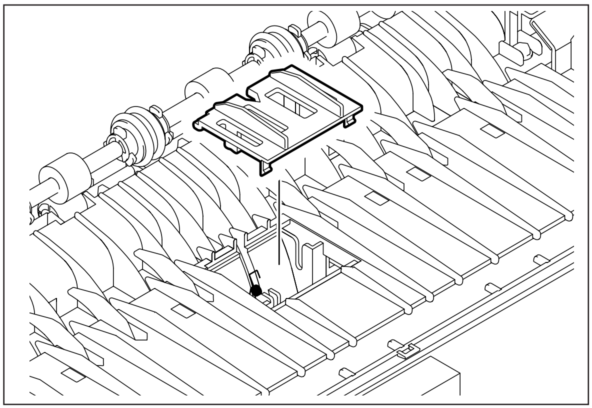


Fig. 13-706

(3) Release 3 latches of the exit sensor and disconnect 1 connector while taking out the exit sensor.

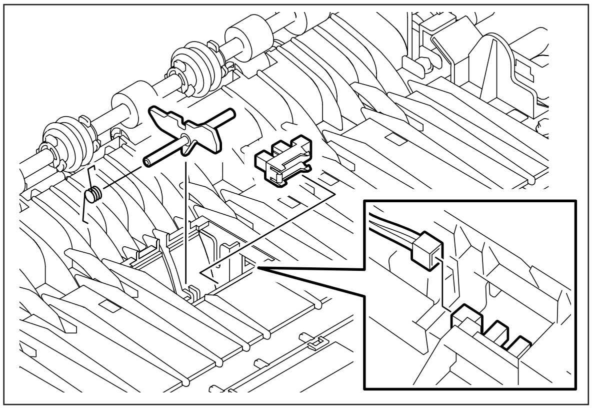


Fig. 13-707

[D] Exit finger

(1) Take off the fuser unit (► Chapter 13.7 [A]).

(2) Open the fuser unit cover and transport guide.

(3) Pull out the shaft from both ends of transport guide and take off 8 exit fingers.

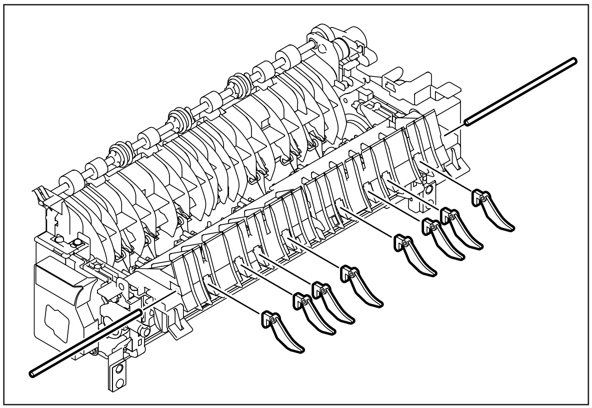


Fig. 13-708

[E] Separation finger for pressure roller

(1) Take off the fuser unit (► Chapter 13.7 [A]).

(2) Open the fuser unit cover and transport guide.

(3) Take off the guide by removing 1 screw for each finger.

(4) Remove 5 springs and take off 5 separation fingers for pressure roller.

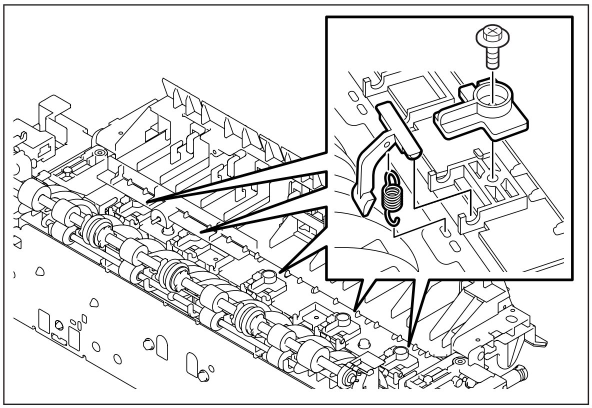


Fig. 13-709

[F] Separation finger for fuser roller PM

(1) Take off the fuser unit (► Chapter 13.7 [A]).

(2) Open the fuser unit cover and transport guide.

(3) Remove 2 screws (one on the front side is a stepped screw) and take off the paper exit unit.

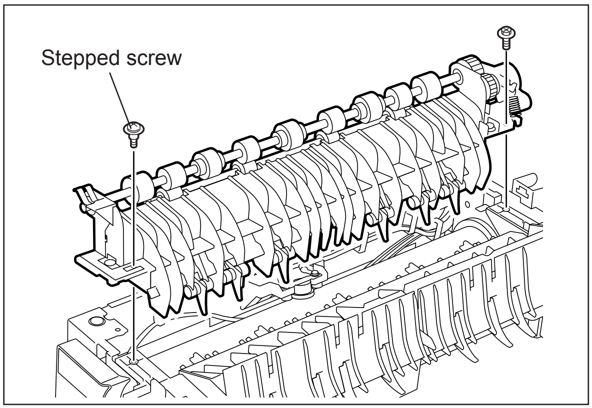


Fig. 13-710

(4) Remove 6 springs and take off 6 separation fingers for fuser roller.

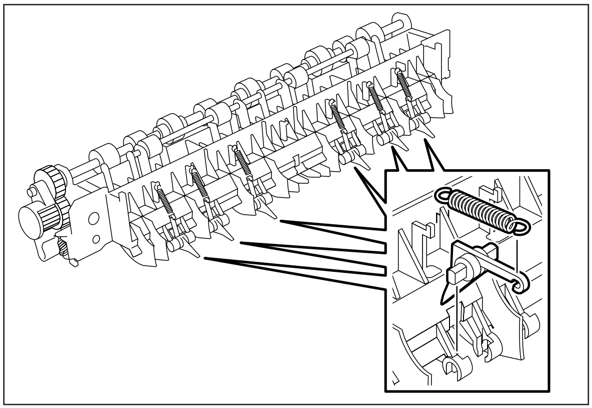


Fig. 13-711

[G] Cleaning roller PM

(1) Take off the fuser unit (► Chapter 13.7 [A]).

(2) Take off the fuser unit cover (► Chapter 13.7 [B]).

(3) Release the harness from the harness guide of the cover on the rear side.

(4) Remove 1 screw and take off the cover on the rear side.

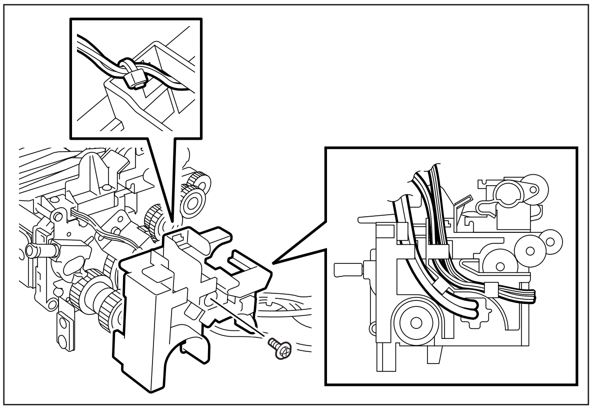


Fig. 13-712

(5) Remove 2 screws on the rear side.

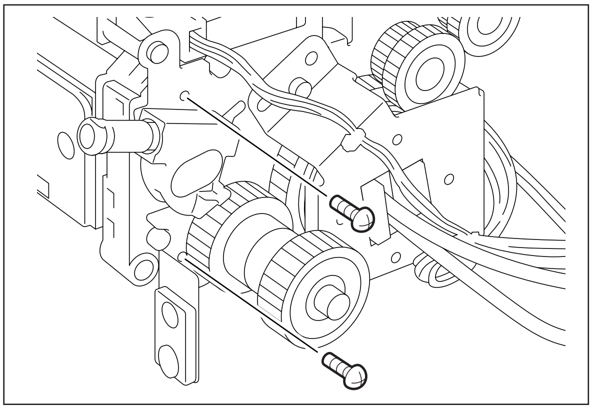


Fig. 13-713

(6) Remove 2 screws on the front side.

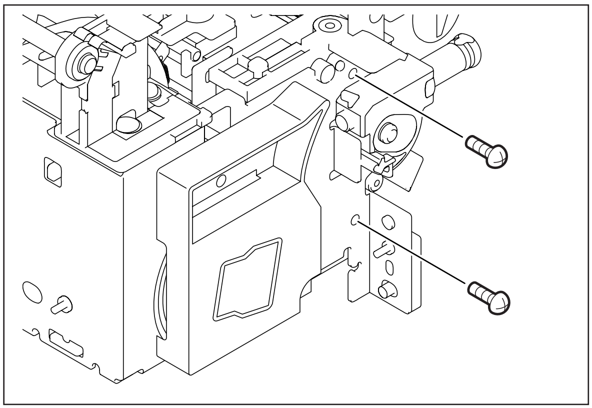


Fig. 13-714

(7) Take off the transport guide.

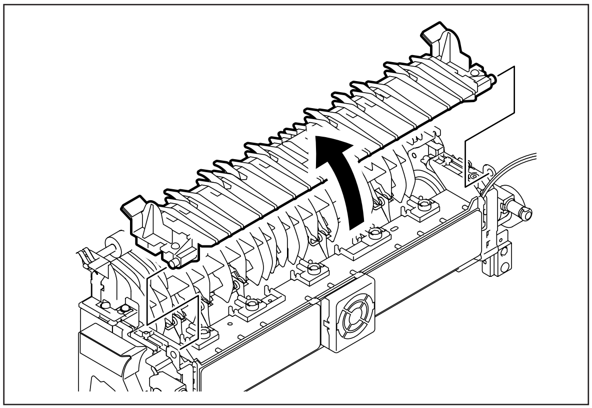


Fig. 13-715

(8) Take off the cleaning unit.

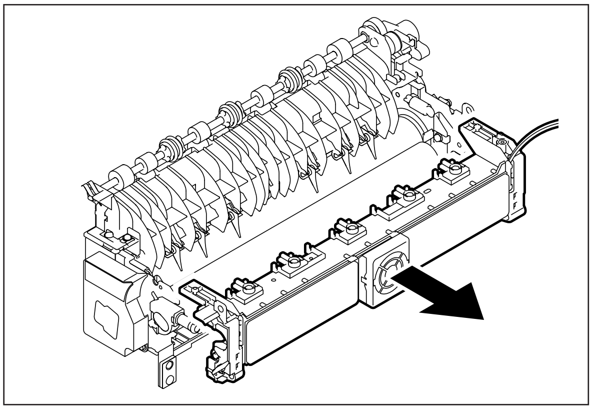


Fig. 13-716

(9) Remove 1 C-ring and take off the cleaning roller with the whole bushings on both sides.

(10) Take off the bushings from the cleaning roller.

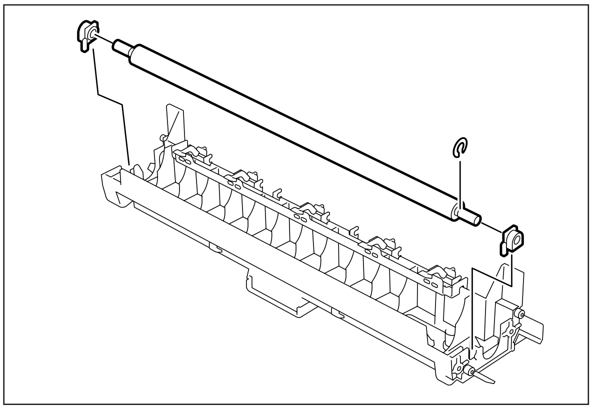


Fig. 13-717

[H] Pressure roller PM

(1) Take off the cleaning unit (► Chapter 13.7 [G]).

(2) Remove the pressure springs on both front and rear sides.

(3) Pull out the pressure lever units on both left and right sides.

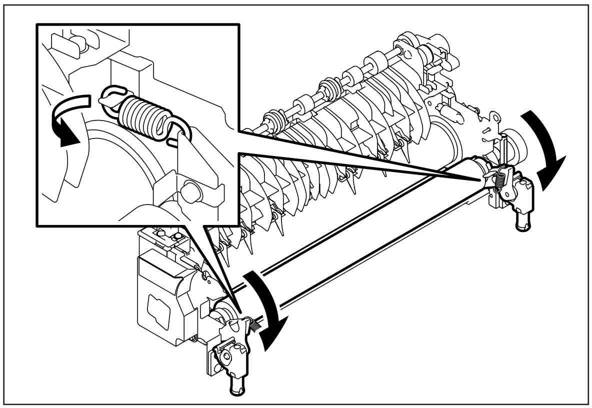


Fig. 13-718

(4) Take out the pressure roller.

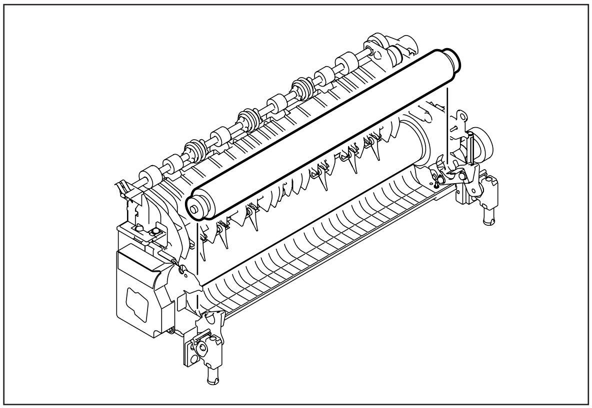


Fig. 13-719

[I] IH coil

(1) Take off the fuser unit (► Chapter 13.7 [A]).

(2) Take off the fuser unit cover (► Chapter 13.7 [B]).

(3) Release the harness from the harness guide of the cover on the rear side.

(4) Remove 1 screw and take off the cover on the rear side.

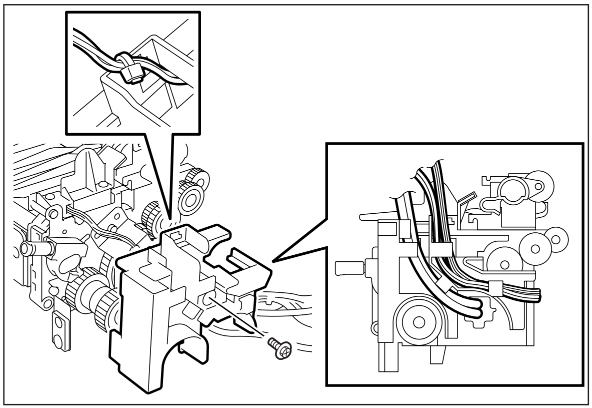


Fig. 13-720

(5) Remove 1 screw and take off the coil holder on the rear side.

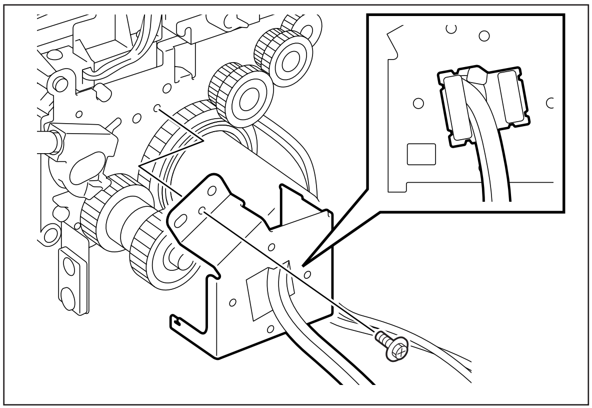


Fig. 13-721

(6) Pull out the IH coil from the rear side.

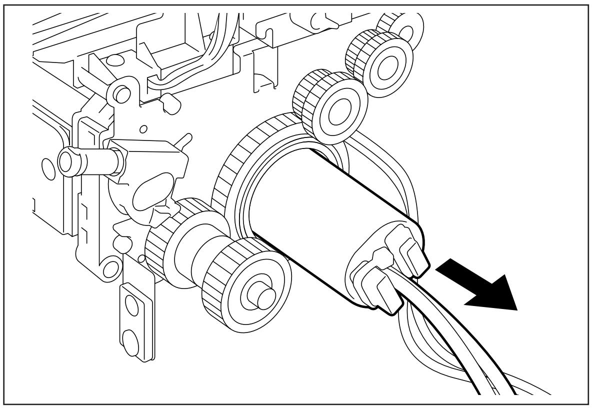


Fig. 13-722

[J] Fuser roller PM

(1) Take off the fuser unit cover (► Chapter 13.7 [B]).

(2) Take off the paper exit unit (► Chapter 13.7 [F]).

(3) Take off the IH coil (► Chapter 13.7 [I]).

(4) Push down the pressure levers on both sides.

(5) Remove the E-ring and gear A on the rear side. After that, remove C-ring, gear and bushing in order.

(6) Remove 2 screws and take off the coil holder on the front side.

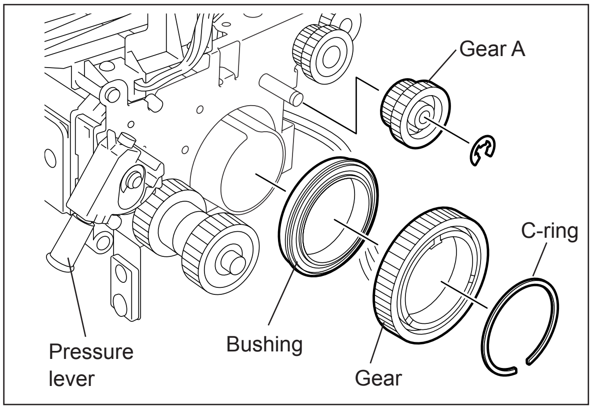


Fig. 13-723

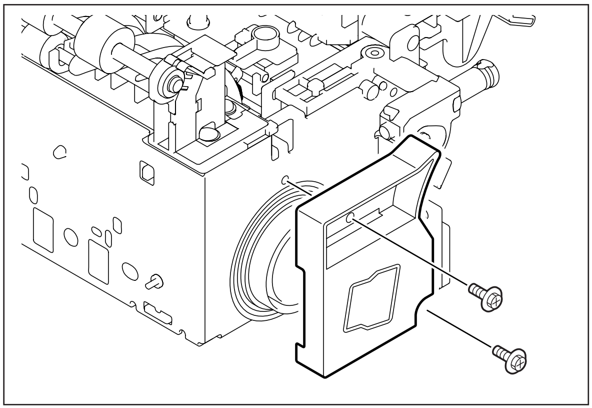


Fig. 13-724

(7) Take out the fuser roller with the bushing from the front side.

(8) Remove C-ring and bushing from the fuser roller.

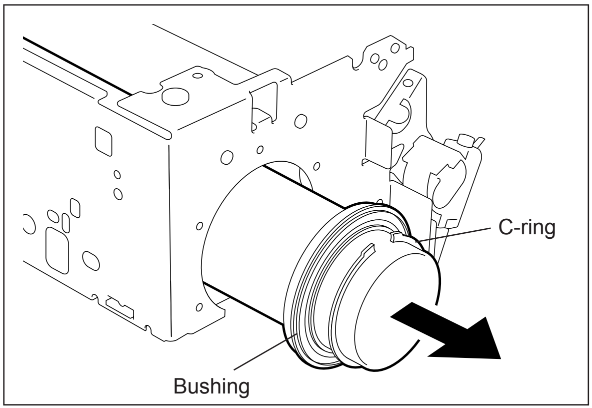


Fig. 13-725

Notes:

When reassembling, pay attention to the followings.

1. When inserting the fuser roller, be careful not to deform the thermistors.
2. Be careful of the installation direction of the gear (the direction of the protrusion inside the gear).
3. Make sure not to scratch the fuser roller. Lay the fuser roller on the clean place and prevent the fuser roller from dust.
4. When the fuser roller has been replaced, make sure to clean the separation fingers for the fuser roller.

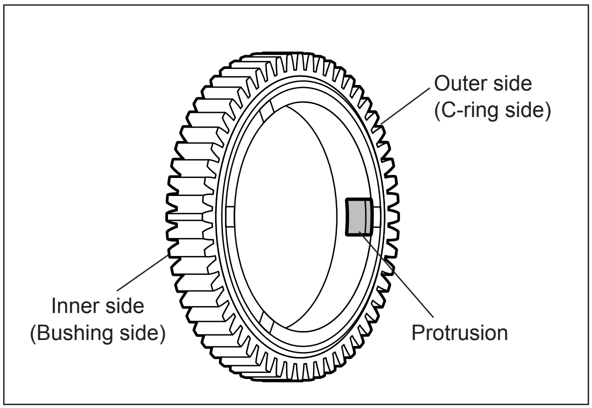


Fig. 13-726

[K] Thermistor

(1) Take off the fuser roller (► Chapter 13.7 [J]).

(2) Release the harnesses from 4 harness clamps.

(3) Remove 1 screw for each thermistor. Then take off the main thermistor and edge thermistor.

Note:

When installing, be careful not to deform the thermistors or the frame (plate).

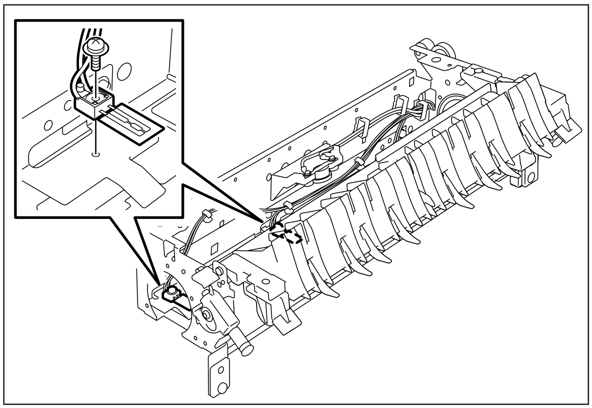


Fig. 13-727

[L] Thermostat

(1) Take off the exit unit (► Chapter 13.7 [F]).

(2) Release the harnesses of thermostat from 3 harness clamps.

(3) Remove 2 screws and take off the thermostat with the whole holder.

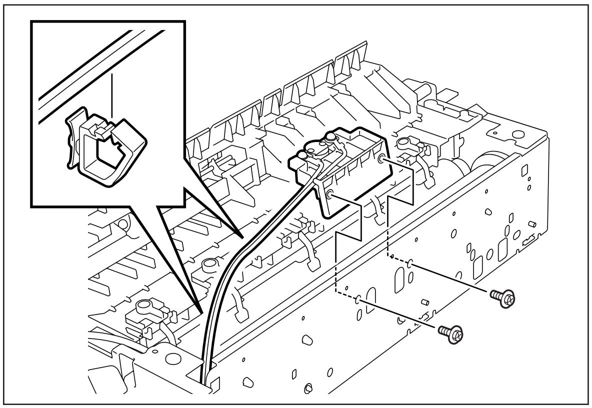


Fig. 13-728

(4) Remove 2 screws and take off the thermostat from the holder.

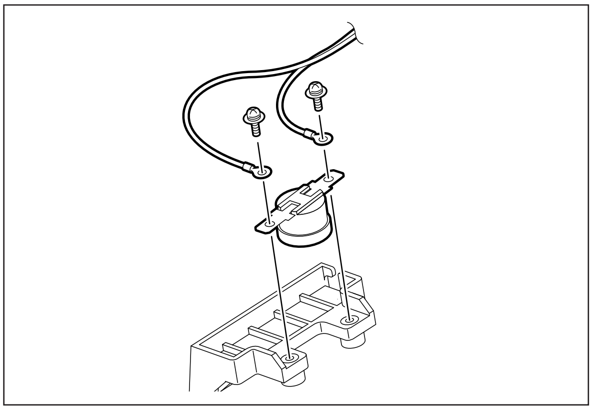


Fig. 13-729

Notes:

When installing, pay attention to the followings.

1. Make sure to fix the thermostat, and then harness terminal in order on the holder.
2. Make sure that the fuser roller is pressed to the pressure roller when adjusting the gap between the fuser roller and thermostat with the screw A to be 1.5 mm to 1.9 mm.

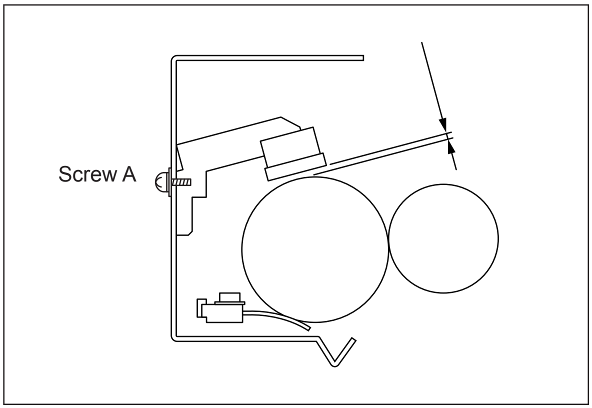


Fig. 13-730

[M] IH control PC board (IH board)

(M-1) IH board

(1) Take off the IH terminal cover (► Chapters 2.5.1 [L]).

(2) Take off the right rear cover (► Chapter 2.5.1 [P]).

(3) Take off the SYS board with the whole case (► Chapter 2.5.2 [C]).

(4) Remove 3 screws and take off the IH board cover.

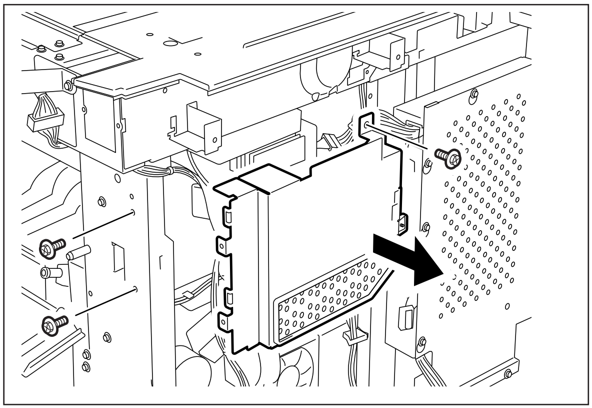


Fig. 13-731

(5) Disconnect 2 connectors with lock and 4 connectors.

(6) Remove 4 screws and take off the IH board.

Cautions:

1. Tighten 2 screws (A) of the IH coil power supply harness completely (tightening torque: 1.17 - 1.56 N·m).
2. Since the IH control board is a high-voltage section, make sure to pull out the power cable at maintenance.

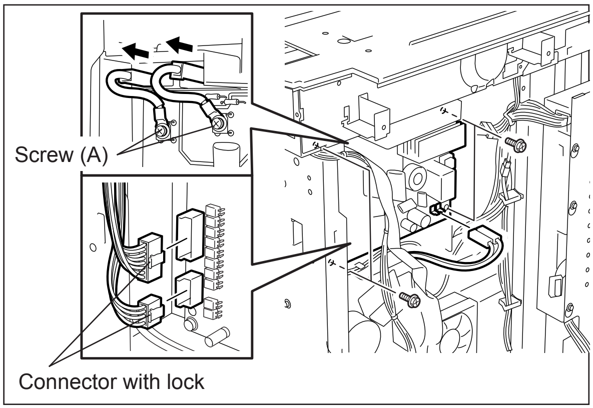


Fig. 13-732

(M-2) IH board unit

(1) Take off the IH terminal cover. Disconnect 1 connector with lock and 2 faston terminals (► Chapters 2.5.1 [L] and 13.7 [A]).

(2) Take off the right rear cover (► Chapter 2.5.1 [P]).

(3) Take off the SYS board with the whole case (► Chapter 2.5.2 [C]).

(4) Take off the IH board cover (► Chapter 13.7 (M-1)).

(5) Disconnect 3 connectors and remove 2 screws, and then take off the IH board with the whole bracket.

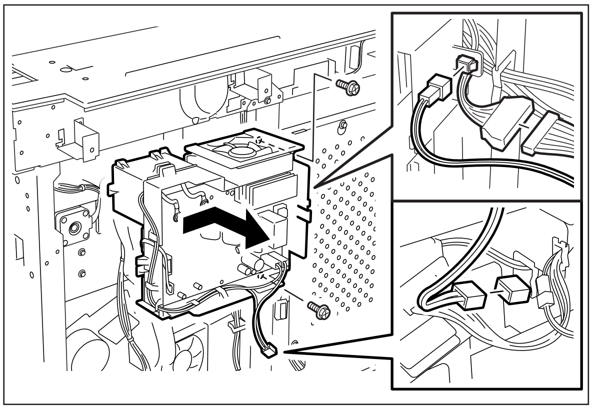


Fig. 13-733

[N] IH board cooling fan

(1) Take off the IH control PC board with the whole bracket (► Chapter 13.7 (M-2)).

(2) Remove 1 screw and take off the fan cover.

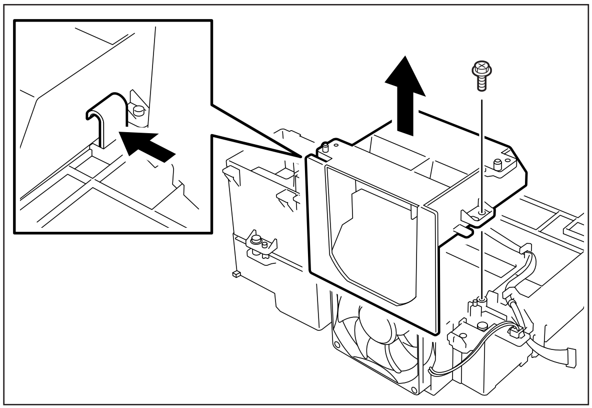


Fig. 13-734

(3) Remove 1 connector and take off the IH board cooling fan.

Note:

When installing, pay attention to the direction of the wind from the fan.

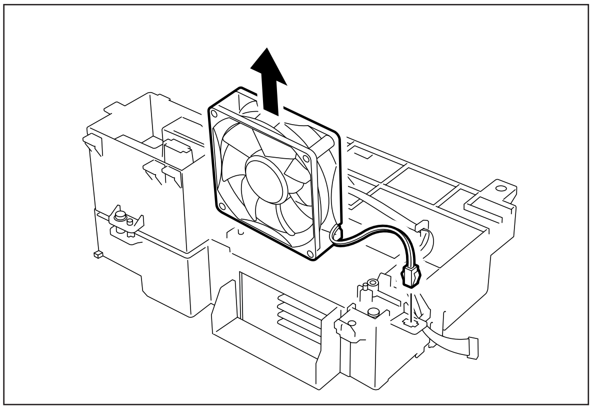


Fig. 13-735

[O] Exit motor

(1) Take off the fuser unit (► Chapter 13.7 [A]).

(2) Take off the IH control PC board with the whole bracket (► Chapter 13.7 (M-2)).

(3) Remove 2 screws and disconnect 1 connector and take off the exit motor.

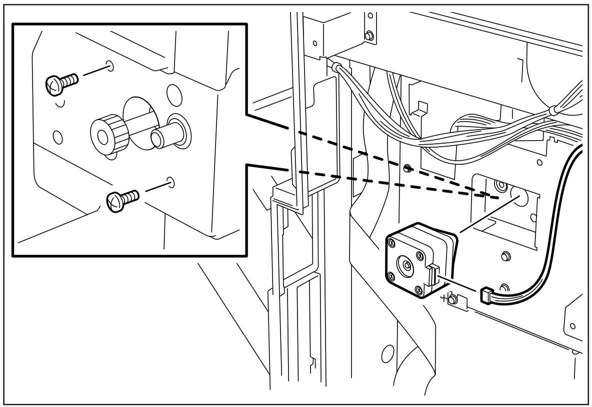


Fig. 13-736

[P] Exit roller

(1) Take off the fuser unit (► Chapter 13.7 [A]).

(2) Open the fuser unit cover and transport guide.

(3) Remove 1 spring. Then remove E-ring (small), gear unit and gear in order.

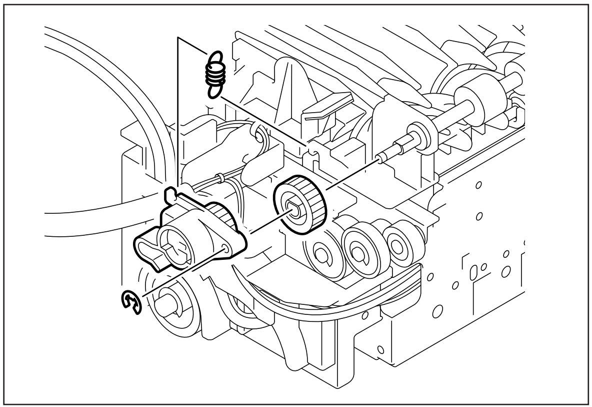


Fig. 13-737

(4) Release the spring force (2 springs) of the lower exit roller.

(5) Remove E-rings and bushings on both sides (metal bushing on front side) and take off the upper exit roller.

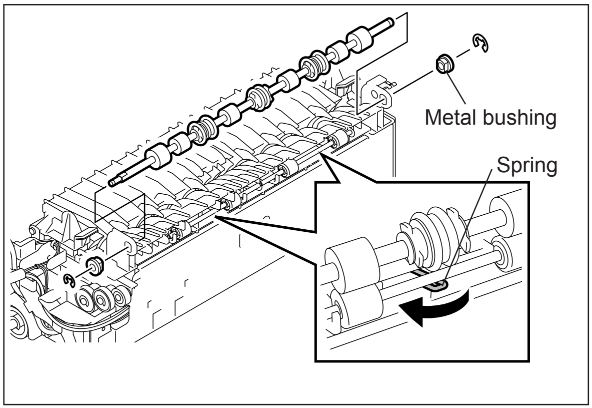


Fig. 13-738

(6) Take off the lower exit roller.

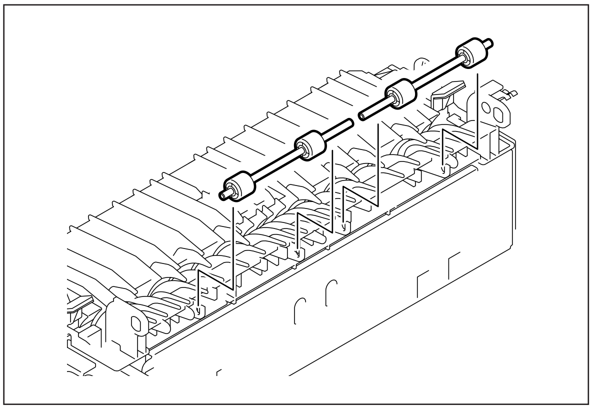


Fig. 13-739

14. AUTOMATIC DUPLEXING UNIT (ADU)

14.1 General Description

The Automatic Duplexing Unit (ADU) is a unit to automatically print on both sides of paper. A switchback method using the exit roller is adopted for the ADU of this equipment.

A sheet of paper is switchbacked by the exit roller right after the printing operation (fusing operation) on one side is completed, and the reversed sheet is transported to the registration section for the other side of the sheet to be printed.

The ADU mainly consists of the transport rollers and their drive system, paper guide and ADU entrance/exit sensor.

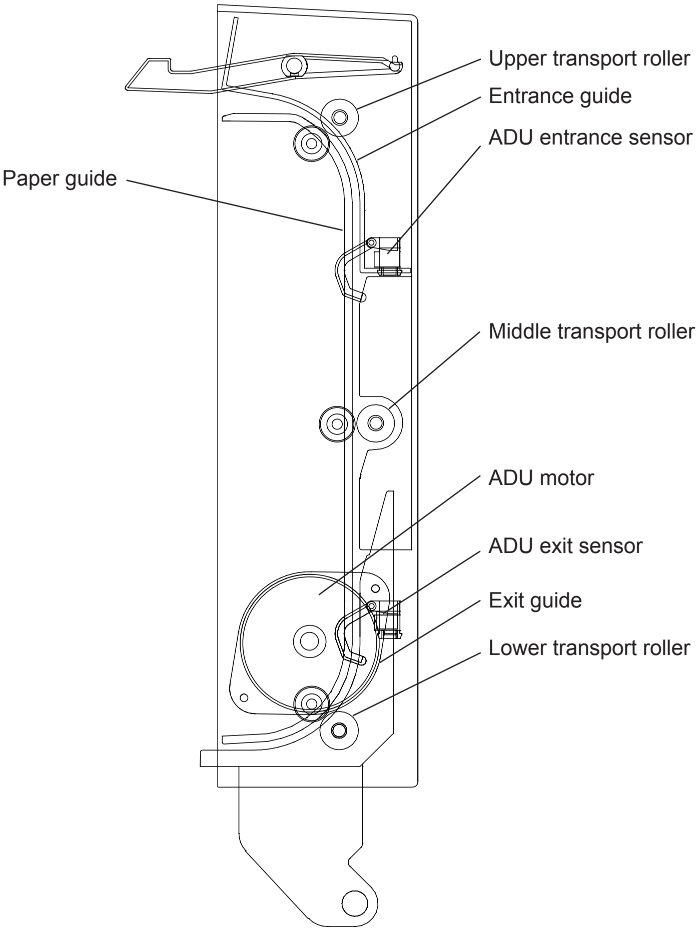

Upper transport roller
Entrance guide
ADU entrance sensor
Paper guide
Middle transport roller
ADU motor
ADU exit sensor
Exit guide
Lower transport roller

Fig. 14-101

14.2 Description of Operations

The back side printing (recording data of the back side of paper) is performed first by selecting duplex printing mode and pressing the [START] button. When the trailing edge of the paper passes the exit gate, the paper is switchbacked by the exit roller and transported into the ADU (the exit gate is closed with its own weight), and then the switchbacked paper is transported with acceleration. The transportation decelerates in front of the upper transport roller of the ADU. The front side printing (recording data of the front side of paper) is performed at the registration section. The paper passes through the exit gate again and is transported to the receiving tray to complete duplex printing.

There are three methods of judging a paper jam: (1) whether the ADU entrance sensor is turned ON or not in a specified period of time after the switchback to the ADU started (E510). (2) whether the ADU exit sensor is turned ON or not in a specified period of time after the ADU entrance sensor is turned ON (E520). (3) whether the registration switch is turned ON or not in a specified period of time after the paper feeding from the ADU to the equipment (E110).

If the ADU is opened during duplex printing, the ADU motor and ADU clutch are stopped, namely, ADU open jam occurs (E430).

The equipment is never to be stopped during printing by interruption in any case except paper jam or service call.

The operation of the duplex printing differs depending on the size of the paper; single-paper circulation and alternateness circulation. The figures in the following pages show the circulating operations during duplex copying. The numbers in the figures indicate the page numbers.

(a) Single-paper circulation

With the paper larger than A4/LT size, duplex printing (back-side printing → front-side printing) is performed for one sheet at a time as shown below.

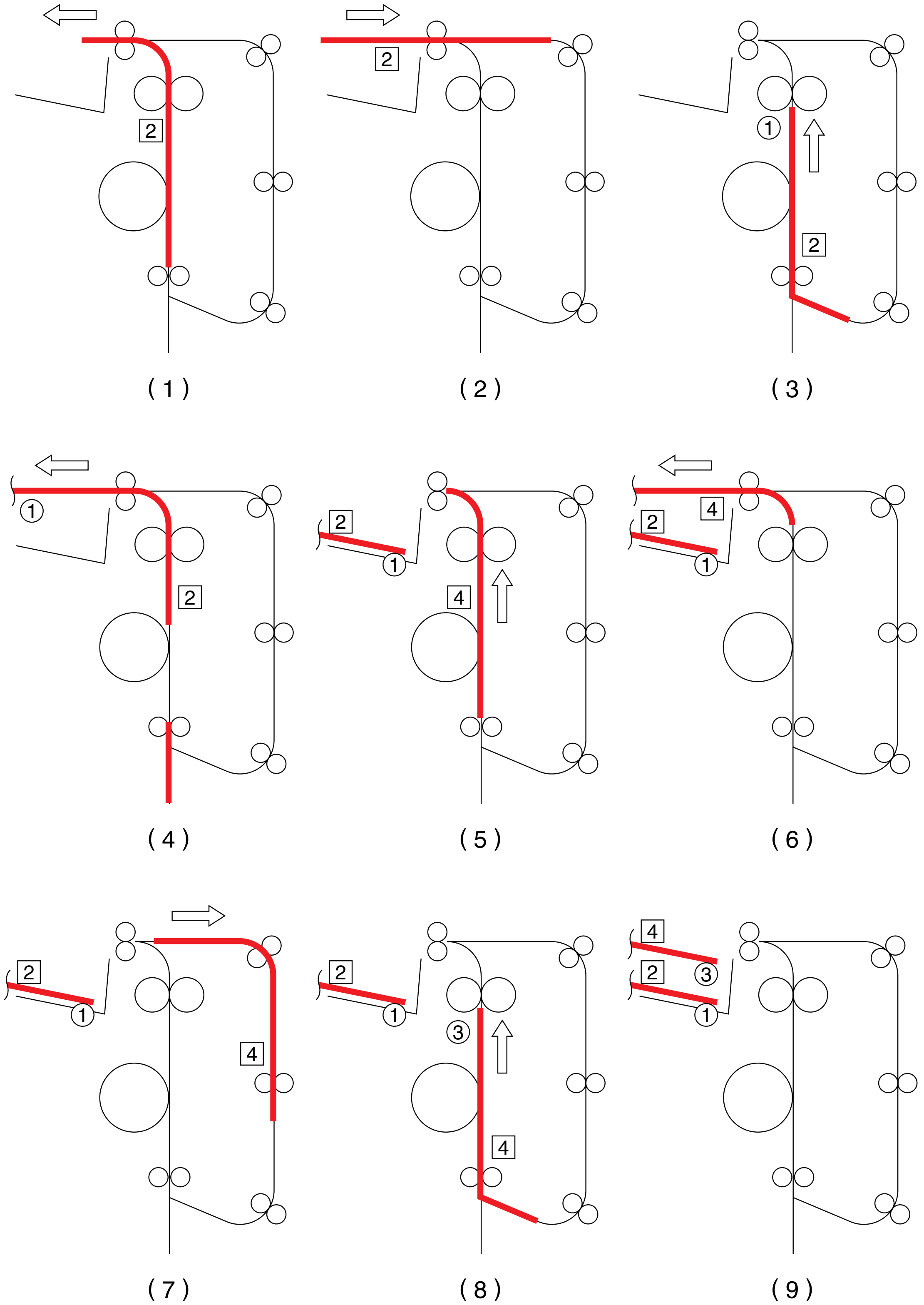
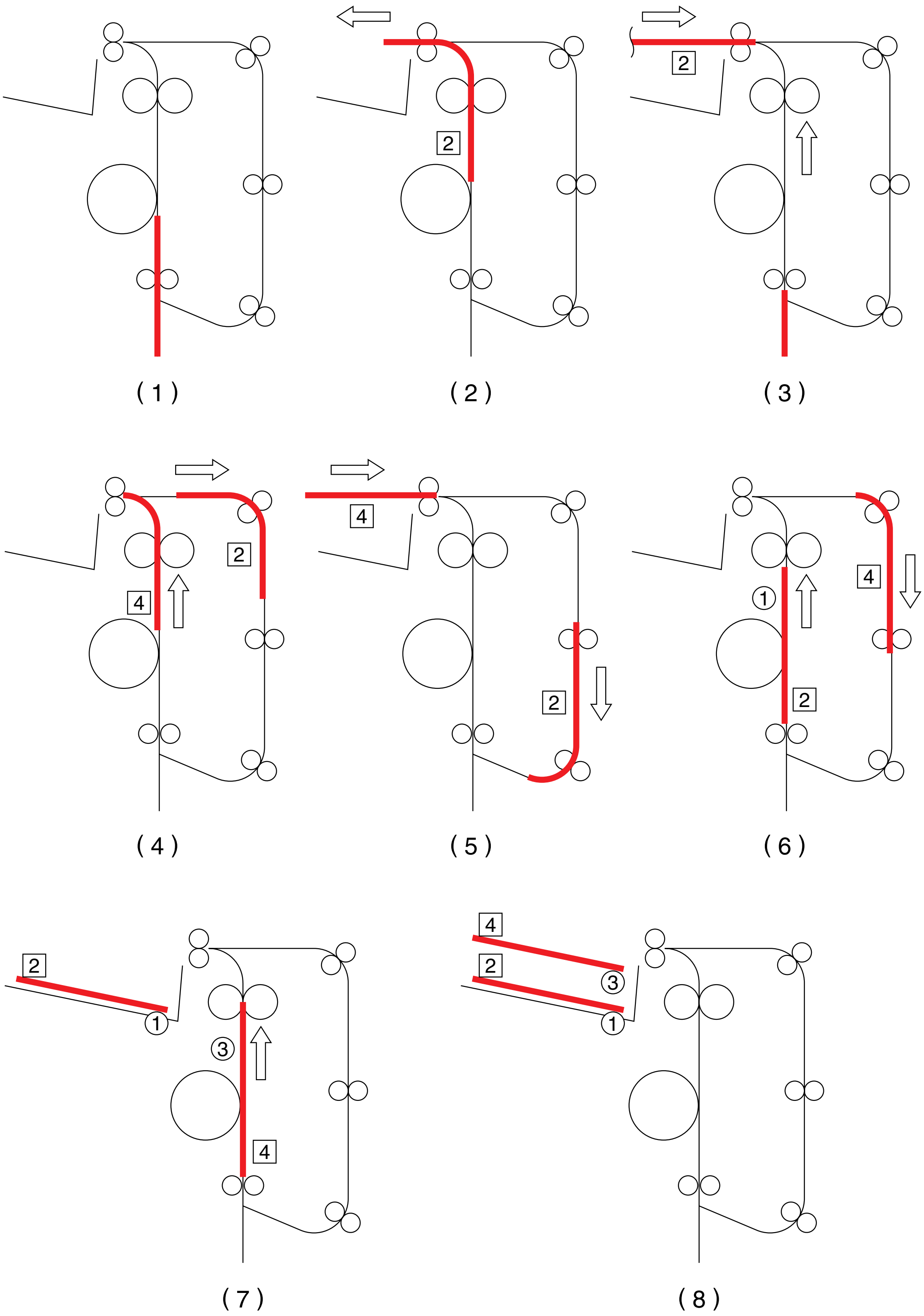

2
(1)
2
(2)
①
2
(3)
①
2
(4)
2
①
4
(5)
2
4
①
(6)
2
①
4
(7)
2
①
③
4
(8)
4
2
③
①
(9)

Fig. 14-201

(b) Double-paper alternateness circulation

With A4/LT size paper or smaller, duplex printing is performed for two sheets at a time as shown below.

Back side of the 1st sheet → Back side of the 2nd sheet → Front side of the 1st sheet → Front side of the 2nd sheet



(1) (2) (3) (4) (5) (6) (7) (8)

Fig. 14-202

(c) Multiple-paper circulation

With more than one sheet of A4/LT size paper or smaller, duplex printing is performed as shown below in a following order:

(In case of 5 sheets)

Back side of the 1st sheet($\boxed{2}$) → Back side of the 2nd sheet($\boxed{4}$) → Front side of the 1st sheet(①) → Back side of the 3rd sheet($\boxed{6}$) → Front side of the 2nd sheet(③) → Back side of the 4th sheet($\boxed{8}$) → Front side of the 3rd sheet(⑤) →Back side of the 5th sheet($\boxed{10}$) → Front side of the 4th sheet (⑦) → Front side of the 5th sheet(⑨)

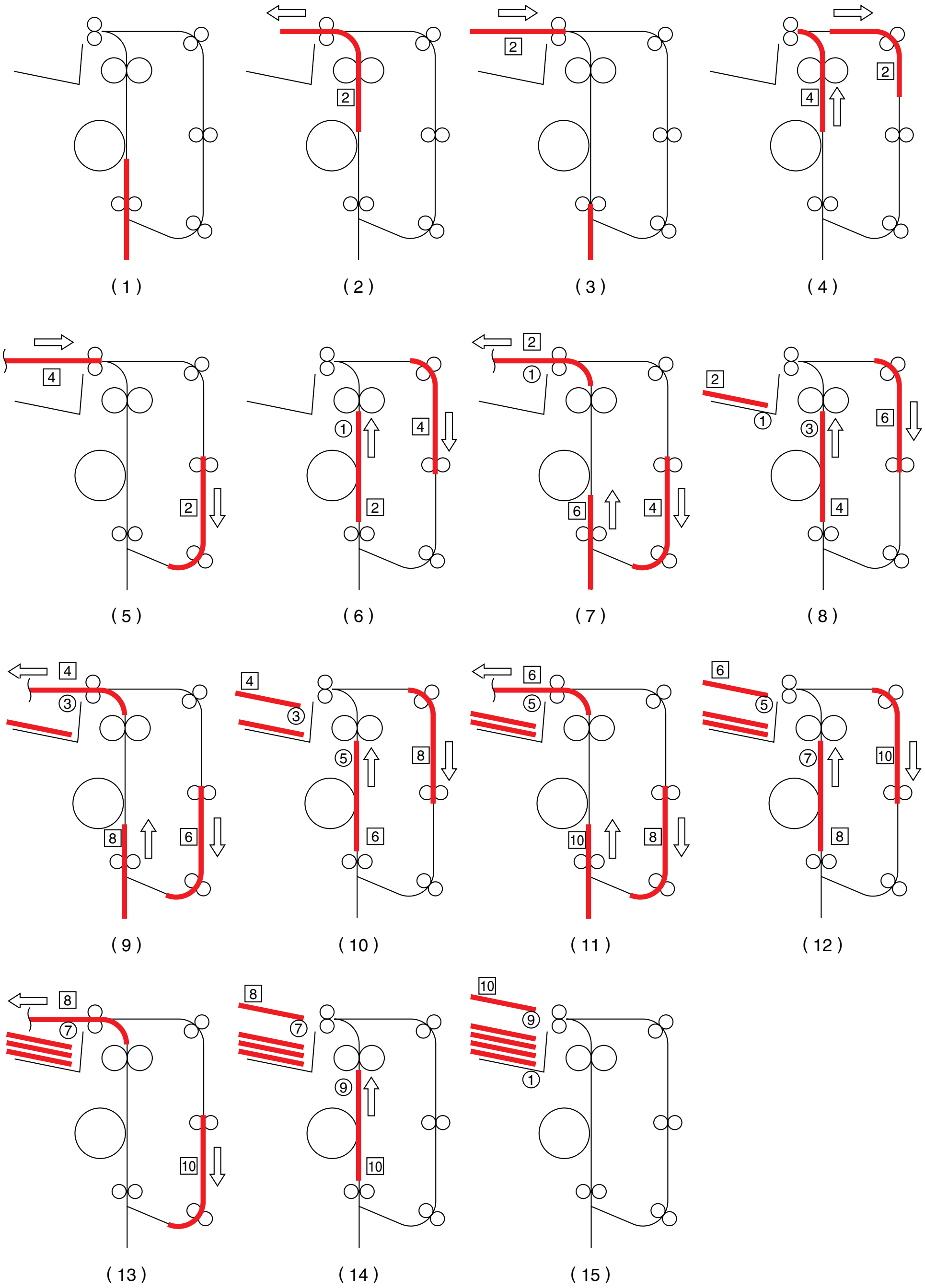
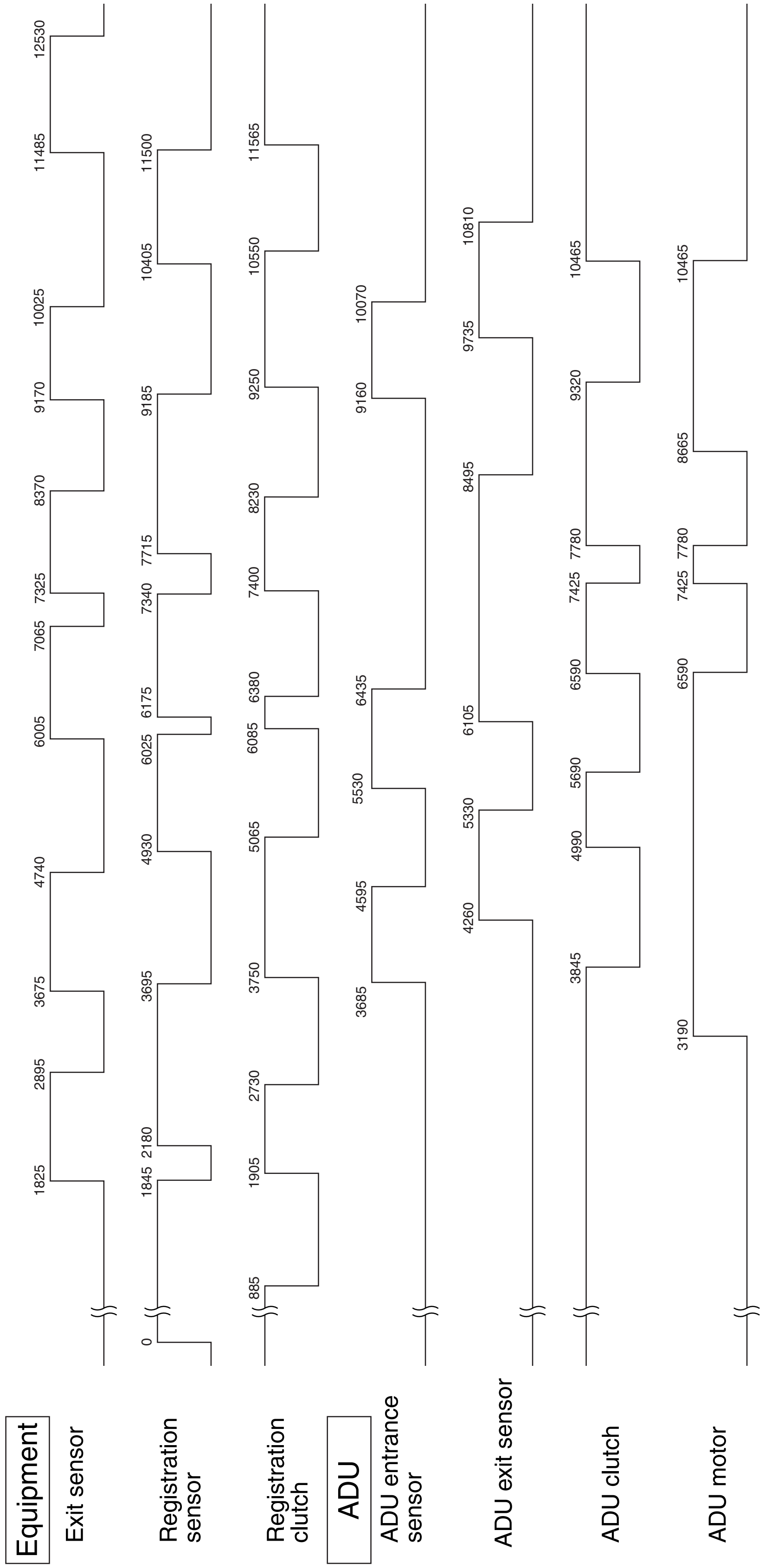
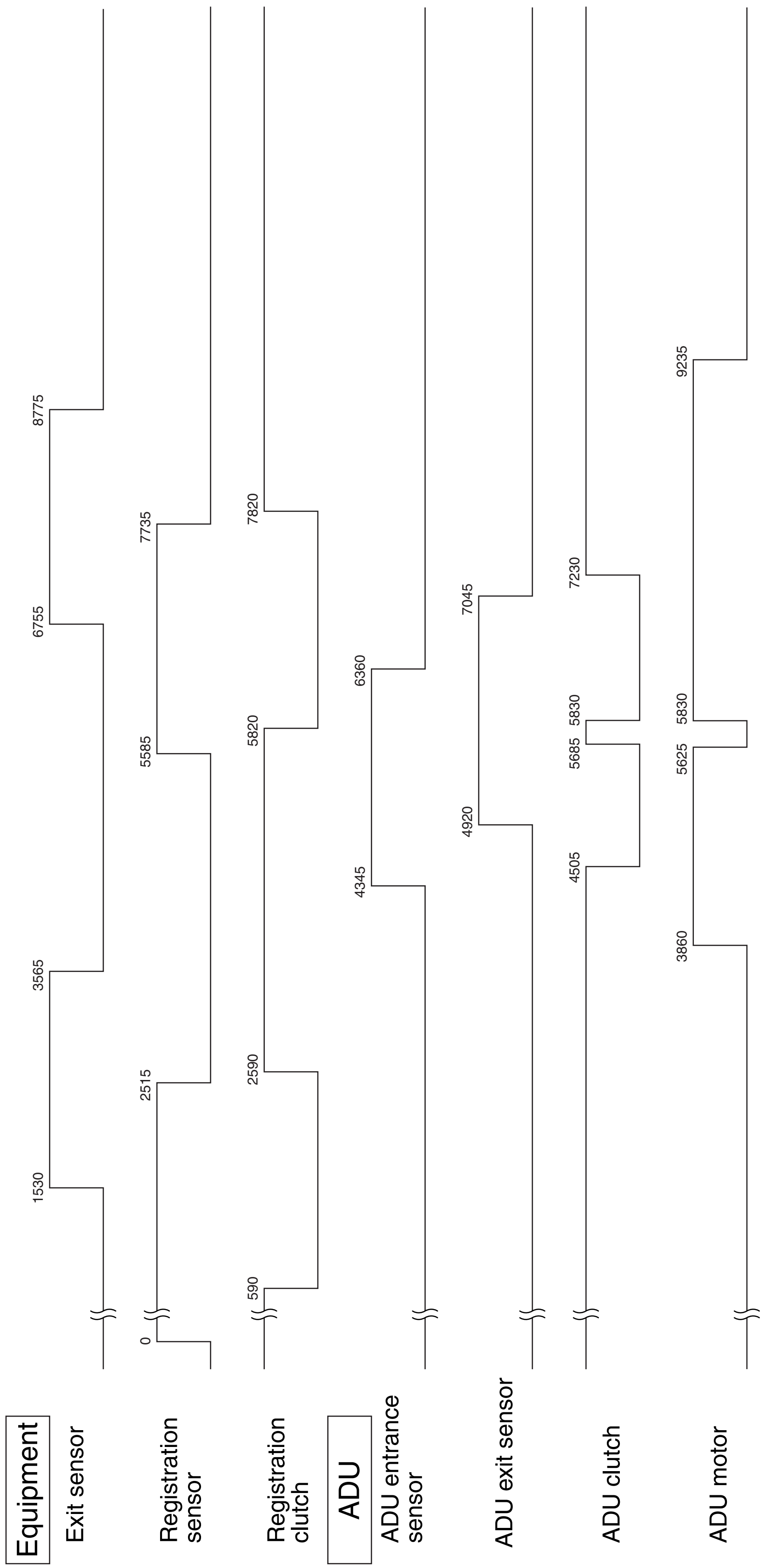


Fig. 14-203

Timing chart for duplex copying from upper drawer (A4, 3 sheets)



Timing chart for duplex copying from upper drawer (A3, 1 sheet)



14.3 Drive of ADU

When the ADU motor rotates to the direction A, the upper transport roller is rotated driven by the gears and belt. The ADU clutch is then turned ON and the middle transport roller and lower transport roller are rotated.

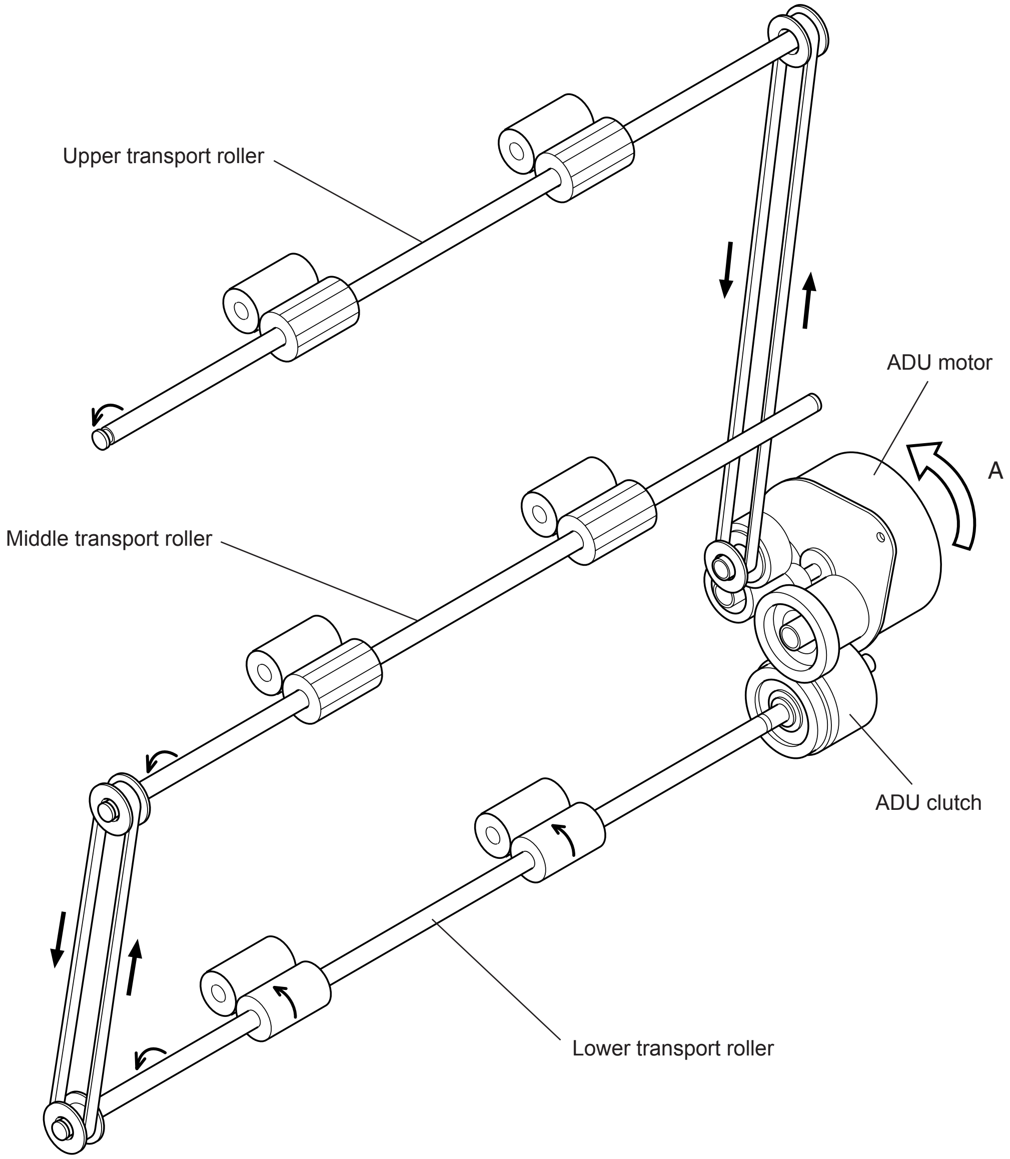

Upper transport roller
ADU motor
A
Middle transport roller
ADU clutch
Lower transport roller

Fig. 14-301

14.4 Flow Chart

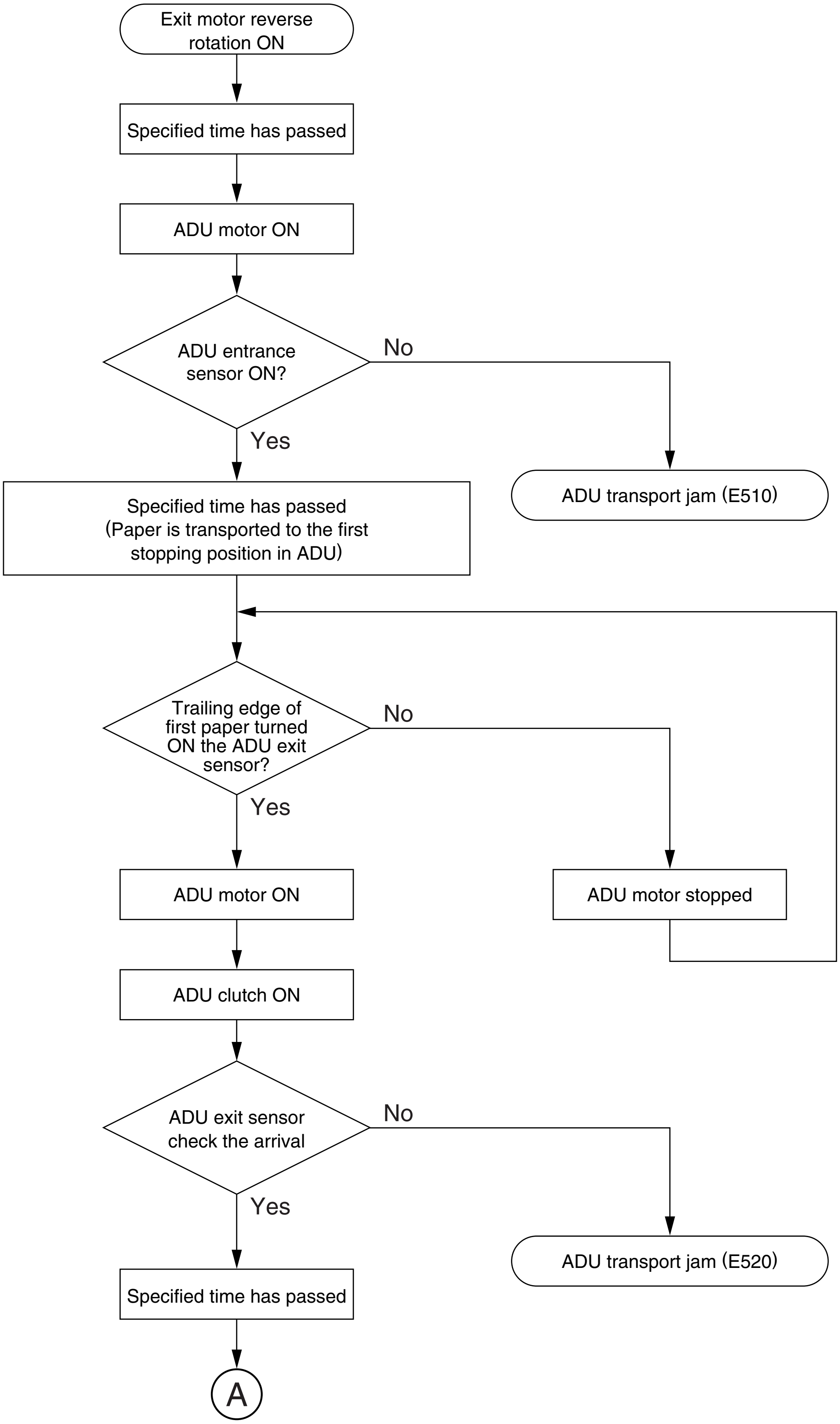

Exit motor reverse rotation ON
Specified time has passed
ADU motor ON
ADU entrance sensor ON?
No
ADU transport jam (E510)
Yes
Specified time has passed (Paper is transported to the first stopping position in ADU)
Trailing edge of first paper turned ON the ADU exit sensor?
No
Yes
ADU motor ON
ADU motor stopped
ADU clutch ON
ADU exit sensor check the arrival
No
Yes
ADU transport jam (E520)
Specified time has passed
A

Fig. 14-401

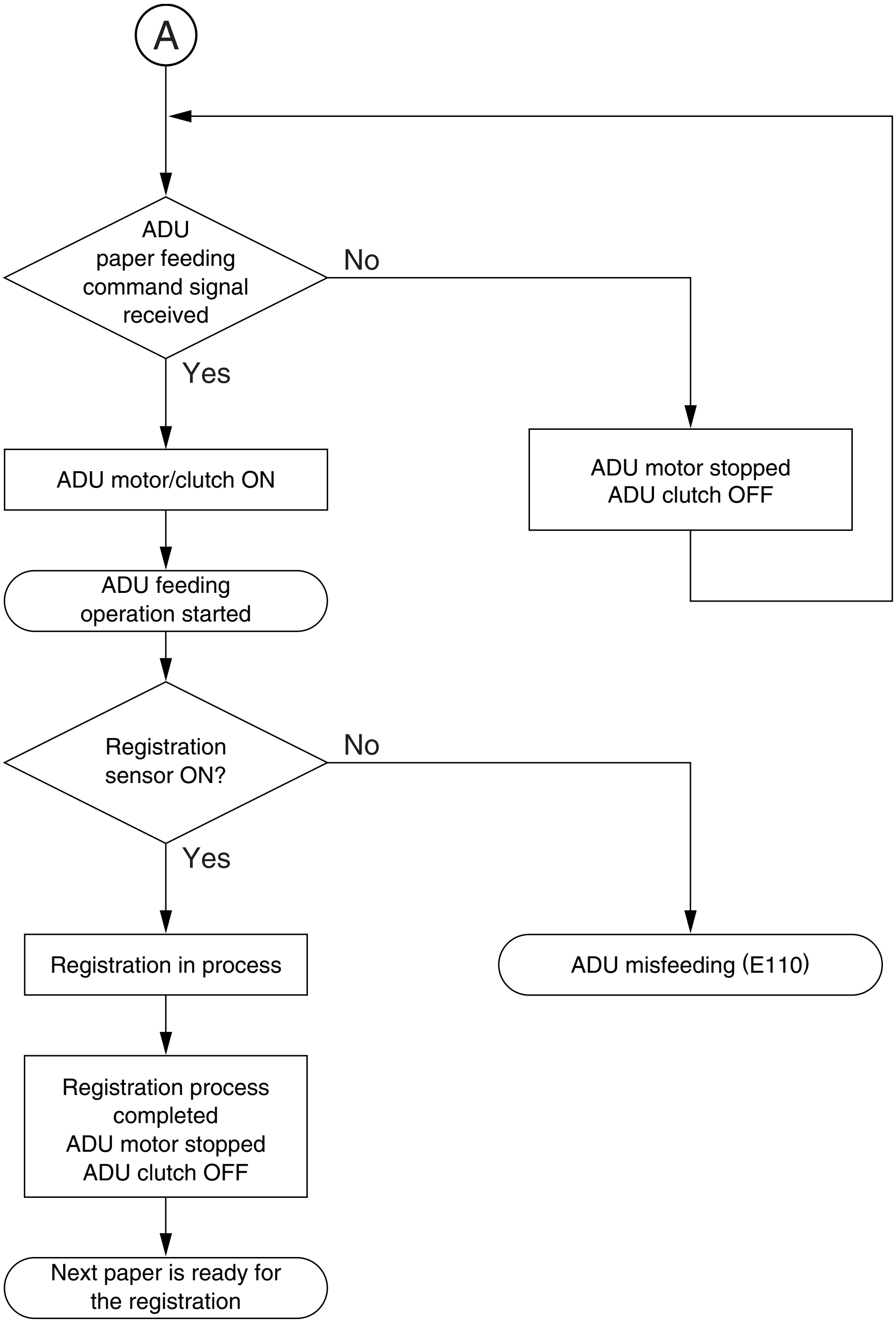

A
ADU paper feeding command signal received
No
Yes
ADU motor/clutch ON
ADU motor stopped
ADU clutch OFF
ADU feeding operation started
Registration sensor ON?
No
Yes
Registration in process
ADU misfeeding (E110)
Registration process completed
ADU motor stopped
ADU clutch OFF
Next paper is ready for the registration

Fig. 14-402

14.5 Disassembly and Replacement

[A] ADU

(1) Take off the upper and lower drawers.

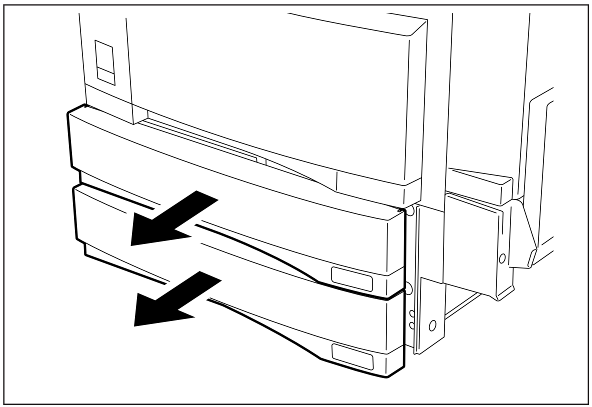


Fig. 14-501

(2) Remove 2 screws and take off the right front hinge cover.

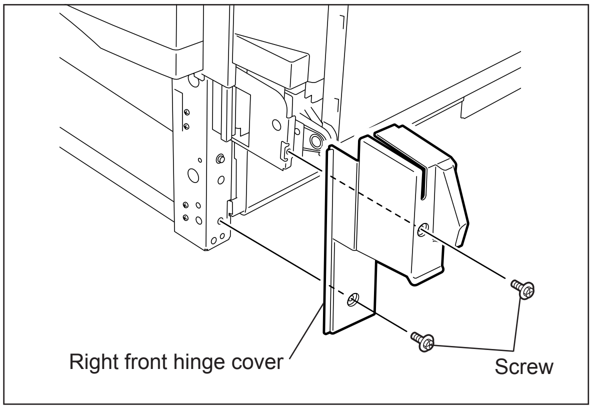

Right front hinge cover
Screw

Fig. 14-502

(3) Remove 2 screws and take off the right rear hinge cover.

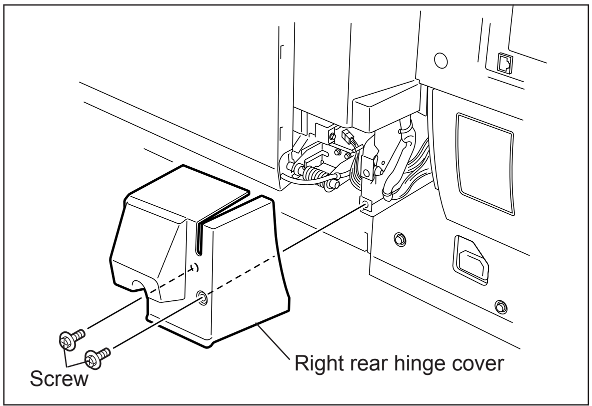

Screw
Right rear hinge cover

Fig. 14-503

(4) Remove 2 screws and take off the right lower cover.

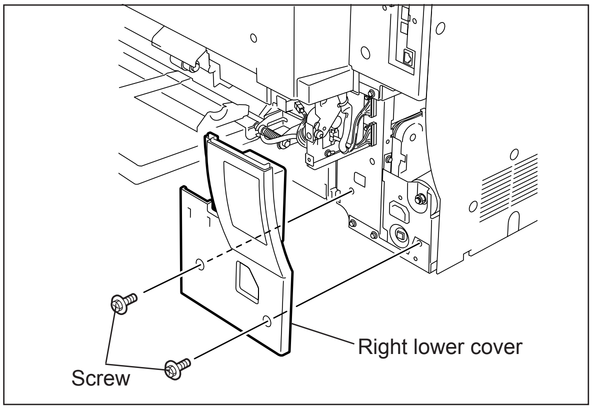

Right lower cover
Screw

Fig. 14-504

(5) Disconnect 1 connector and remove 1 screw and take off the ground wires.

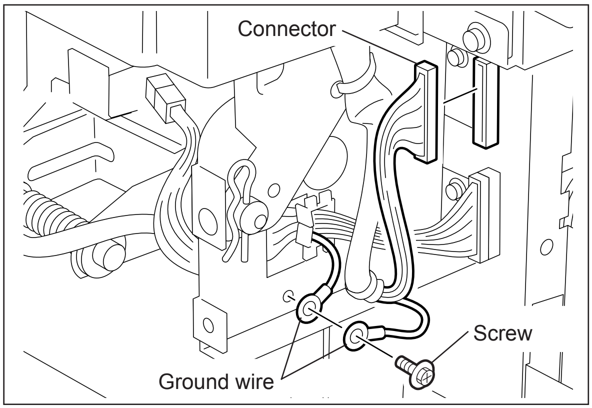

Connector
Screw
Ground wire

Fig. 14-505

(6) Remove the snap pin and slide ADU to the rear side to take it off.

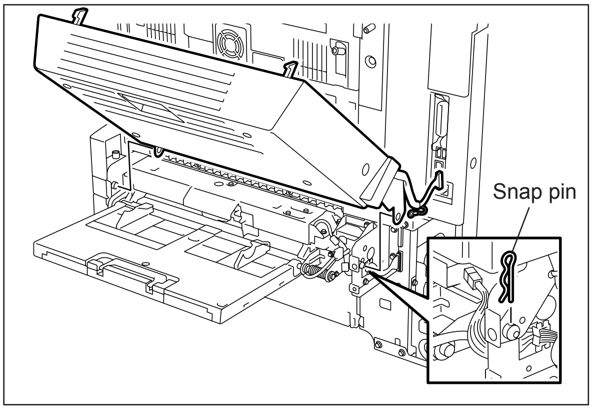


Fig. 14-506

Note:

Since the jam access cover of the e-STUDIO352/353/452/453 does not lock, be sure to fix it temporarily with adhesive tape or such before taking off the ADU.

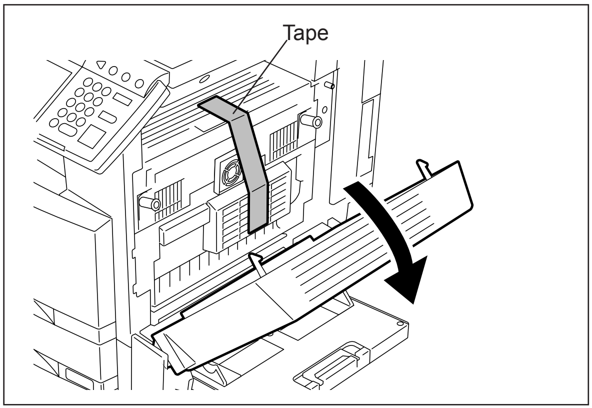


Fig. 14-507

[B] ADU inside rear cover

(1) Take off the ADU (► Chapter 14.5 [A]).

(2) Remove 2 screws and take off the ADU inside rear cover.

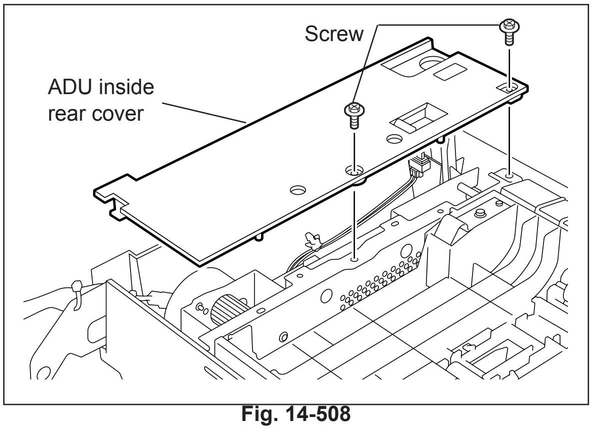

Screw
ADU inside rear cover

Fig. 14-508

[C] ADU opening / closing switch

(1) Take off the ADU (► Chapter 14.5 [A]).

(2) Take off the ADU inside rear cover (► Chapter 14.5 [B]).

(3) Disconnect the connector and release the latch to take off the ADU opening / closing switch.

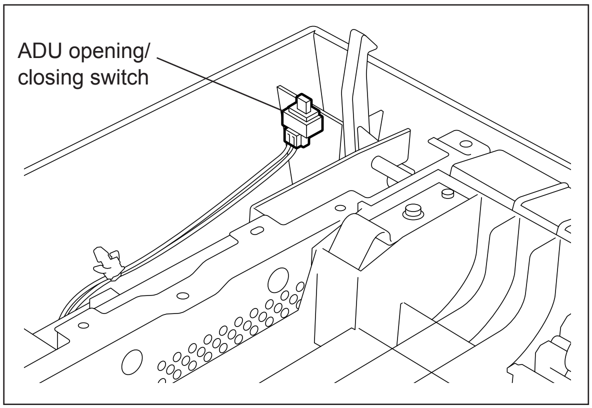


Fig. 14-509

[D] Paper guide

(1) Take off the ADU (► Chapter 14.5 [A]).

(2) Release the fulcrum on the front side and take off the paper guide.

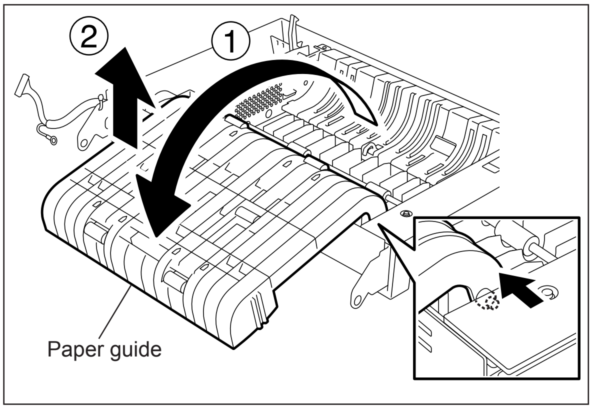


Fig. 14-510

[E] ADU cover

(1) Take off the ADU, ADU inside rear cover, ADU opening / closing switch, and paper guide (► Chapter 14.5 [A] to 14.5 [D]).

(2) Remove 4 screws and take off the ADU cover.

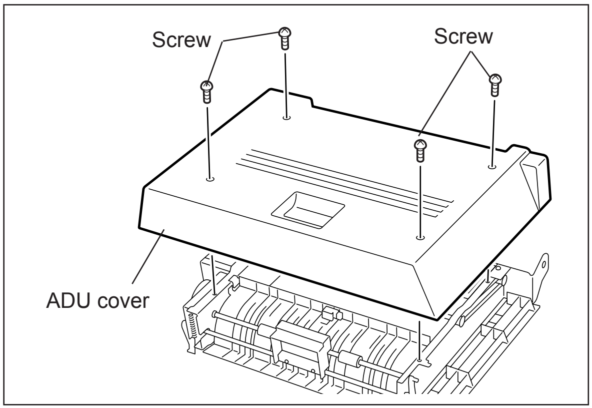


Fig. 14-511

[F] Rear latch

(1) Take off the ADU, ADU inside rear cover, ADU opening / closing switch, paper guide, and ADU cover (► Chapter 14.5 [A] to 14.5 [E]).

(2) Remove the spring.

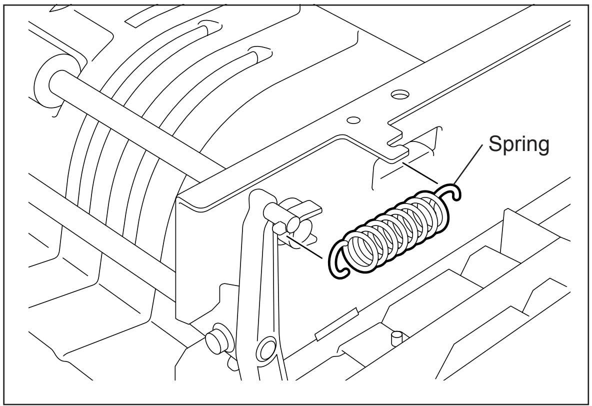


Fig. 14-512

(3) Remove the screw and release the rear latch.

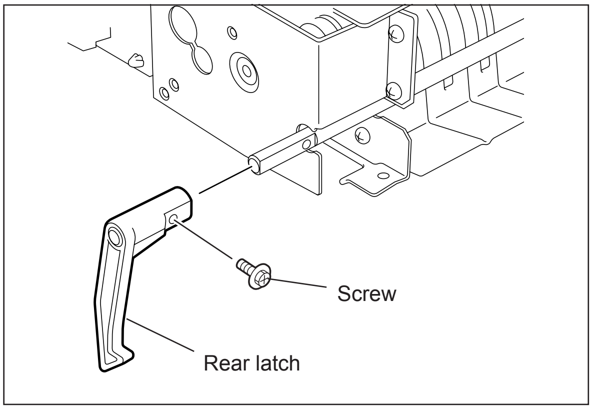

Screw
Rear latch

Fig. 14-513

[G] Opening /Closing lever

(1) Take off the ADU, ADU inside rear cover , ADU opening / closing switch, paper guide, and ADU cover (► Chapter 14.5 [A] to 14.5 [E]).

(2) Remove 2 screws and take off the opening /closing lever.

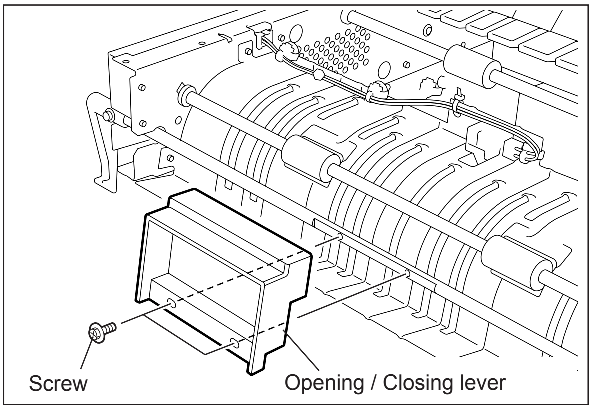

Screw
Opening / Closing lever

Fig. 14-514

[H] ADU entrance sensor, ADU exit sensor

(1) Take off the ADU, ADU inside rear cover, ADU opening / closing switch, paper guide, and ADU cover (► Chapter 14.5 [A] to 14.5 [E]).

(2) Disconnect the connector and release the latch to take off the ADU entrance sensor.

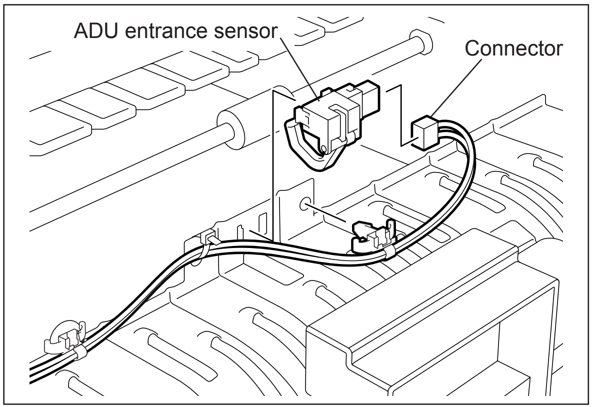

ADU entrance sensor
Connector

Fig. 14-515

(3) Disconnect the connector and release the latch to take off the ADU exit sensor.

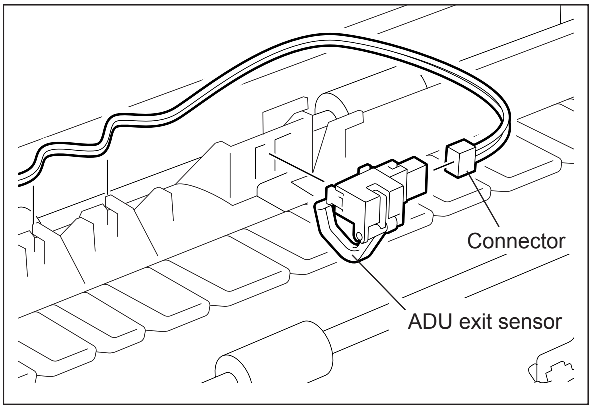

Connector
ADU exit sensor

Fig. 14-516

[I] ADU driving PC board (ADU board)

(1) Take off the ADU, ADU inside rear cover , ADU opening / closing switch, paper guide, and ADU cover (► Chapter 14.5 [A] to 14.5 [E]).

(2) Disconnect 6 connectors and release 4 lock supports to take off ADU board.

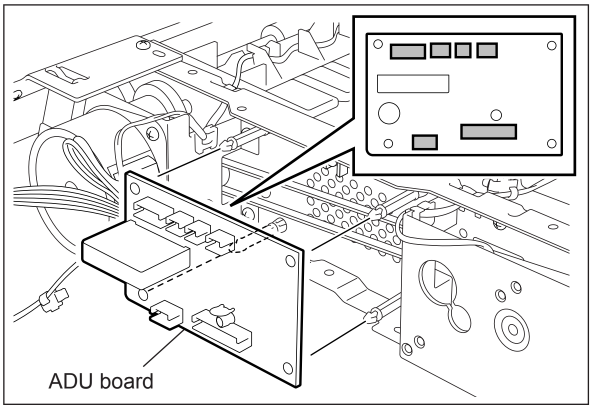


Fig. 14-517

[J] ADU motor

(1) Take off the ADU, ADU inside rear cover , ADU opening / closing switch, paper guide, and ADU cover (► Chapter 14.5 [A] to 14.5 [E]).

(2) Disconnect 1 connector and remove the binding band.

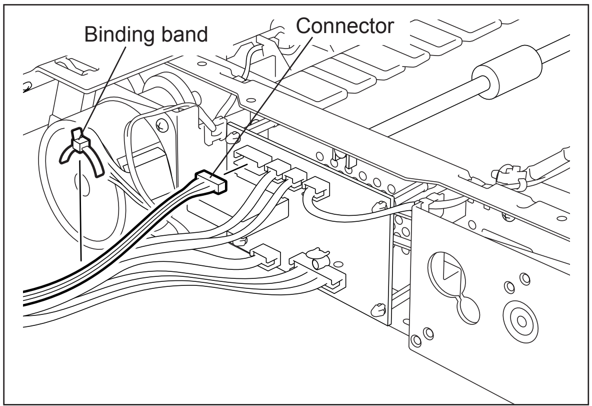


Fig. 14-518

(3) Remove 2 screws.

(4) Lift the ADU motor slightly and shift it to the direction of the arrow to take it off.

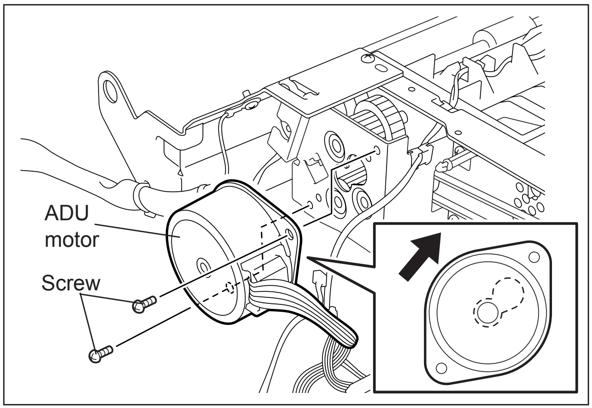


Fig. 14-519

[K] ADU gear unit

(1) Take off the ADU, ADU inside rear cover, ADU opening / closing switch, paper guide, and ADU cover (► Chapter 14.5 [A] to 14.5 [E]).

(2) Take off the ADU motor (► Chapter 14.5 [J]).

(3) Remove 3 screws and take off the ADU gear unit.

Note:

Match the protrusion of clutch with the position shown in the figure when assembling.

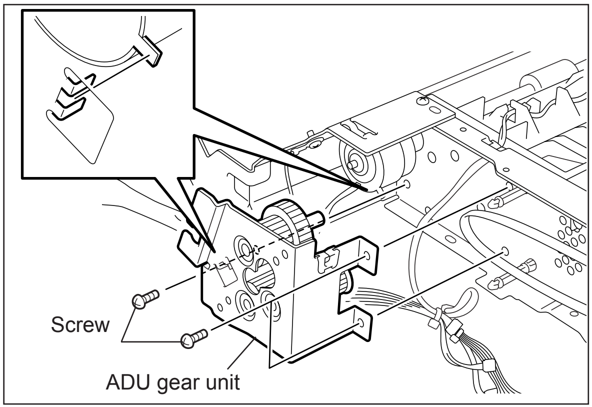


Fig. 14-520

[L] ADU clutch

(1) Take off the ADU, ADU inside rear cover , ADU opening / closing switch, paper guide, and ADU cover (► Chapter 14.5 [A] to 14.5 [E]).

(2) Take off the ADU motor (► Chapter 14.5 [J]).

(3) Take off the ADU gear unit (► Chapter 14.5 [K]).

(4) Remove 1 screw and disconnect the ground wire.

(5) Disconnect 1 connector.

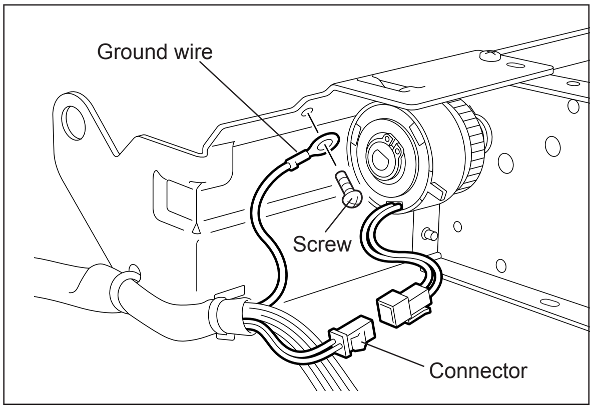

Ground wire
Screw
Connector

Fig. 14-521

(6) Loosen 1 setscrew and take off the ADU clutch.

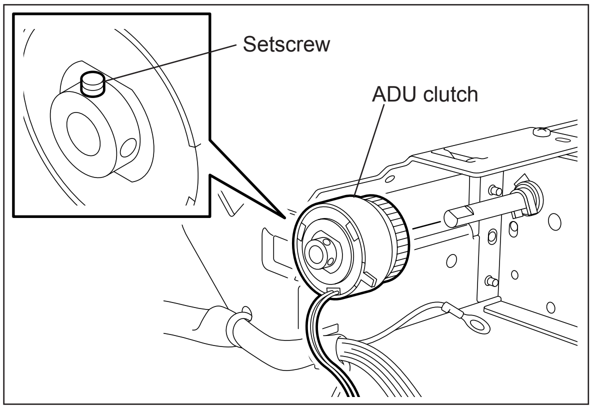

Setscrew
ADU clutch

Fig. 14-522

[M] Upper transport roller

(1) Take off the ADU, ADU inside rear cover , ADU opening / closing switch, paper guide, and ADU cover (► Chapter 14.5 [A] to 14.5 [E]).

(2) Remove 2 screws and take off the opening /closing lever.

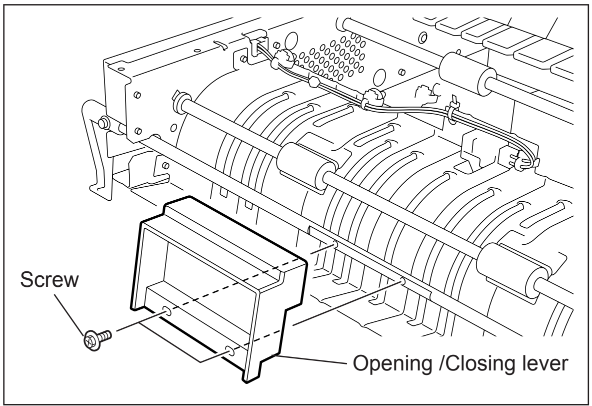

Screw
Opening /Closing lever

Fig. 14-523

(3) Remove the spring.

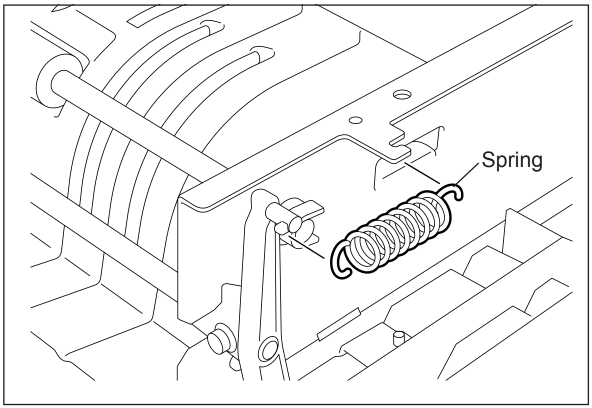


Fig. 14-524

(4) Remove the screw and release the rear latch.

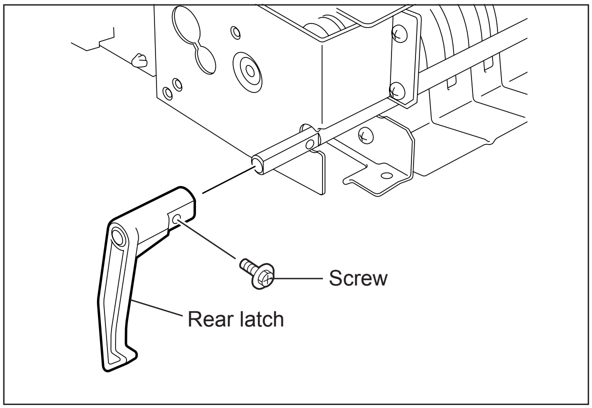

Screw
Rear latch

Fig. 14-525

(5) Remove 4 screws and take off the bracket.

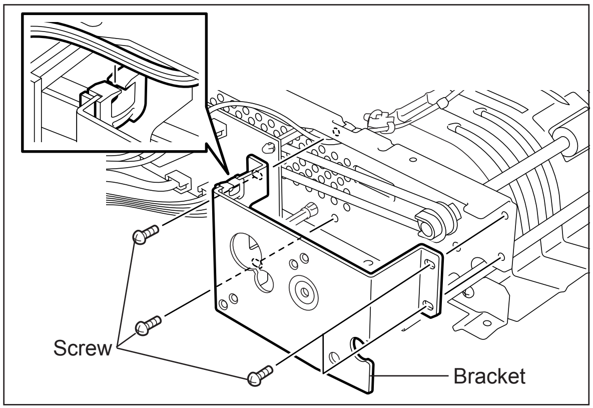

Screw
Bracket

Fig. 14-526

(6) Remove the clip, pulley, pin and belt on the rear side.

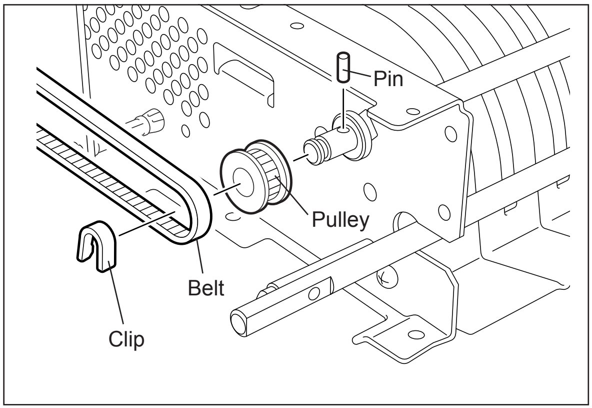

Pin
Pulley
Belt
Clip

Fig. 14-527

(7) Remove the clip on the front side.

(8) Remove 2 bushings and take off the upper transport roller.

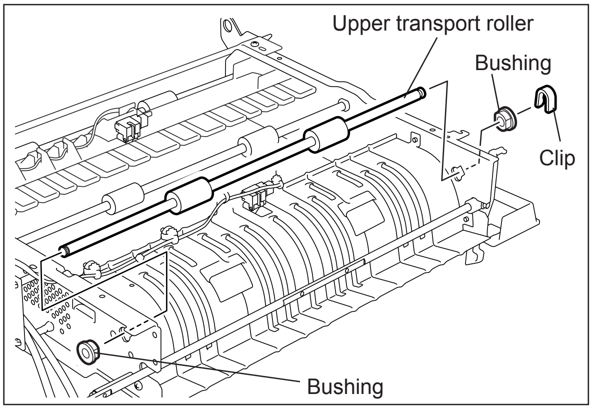

Upper transport roller
Bushing
Clip
Bushing

Fig. 14-528

[N] Middle transport roller

(1) Take off the ADU, ADU inside rear cover, ADU opening / closing switch, paper guide, and ADU cover (► Chapter 14.5 [A] to 14.5 [E]).

(2) Take off the ADU board.

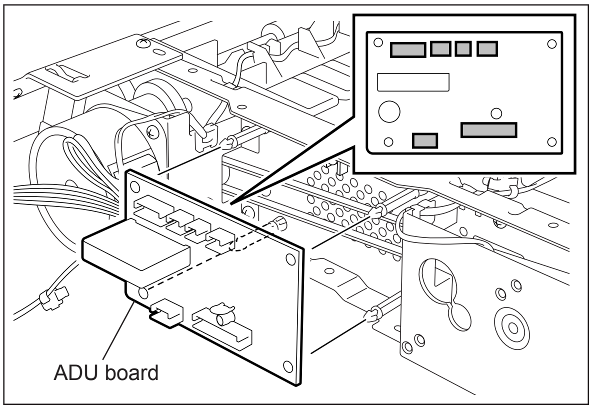


Fig. 14-529

(3) Remove the clip, pulley, pin and belt on the front side.

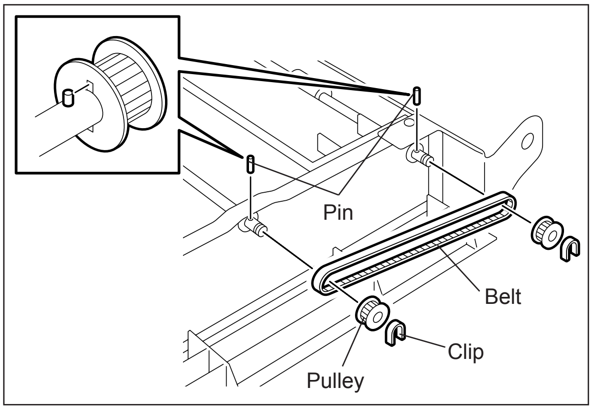

Pin
Belt
Clip
Pulley

Fig. 14-530

(4) Remove the clip on the rear side.

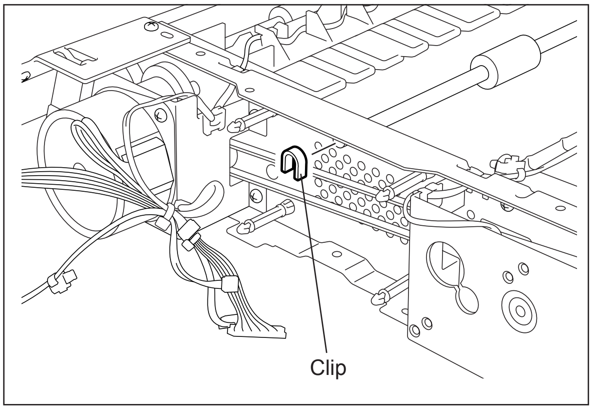


Fig. 14-531

(5) Remove 2 bushings and take off the middle transport roller.

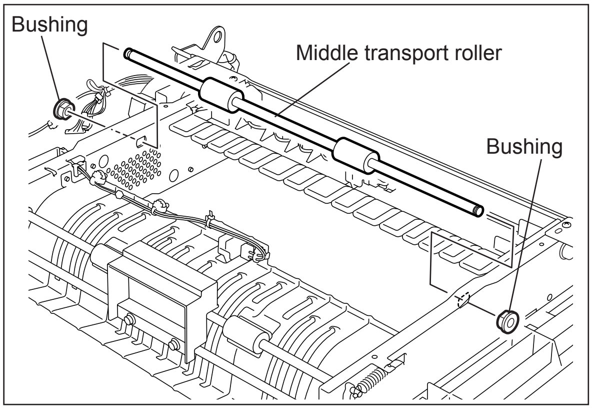

Bushing
Middle transport roller
Bushing

Fig. 14-532

[O] Lower transport roller

(1) Take off the ADU, ADU inside rear cover, ADU opening / closing switch, paper guide, and ADU cover (► Chapter 14.5 [A] to 14.5 [E]).

(2) Take off the ADU motor, the ADU gear unit and the ADU clutch (► Chapter 14.5 [J] to 14.5 [L]).

(3) Remove the clip on the rear side.

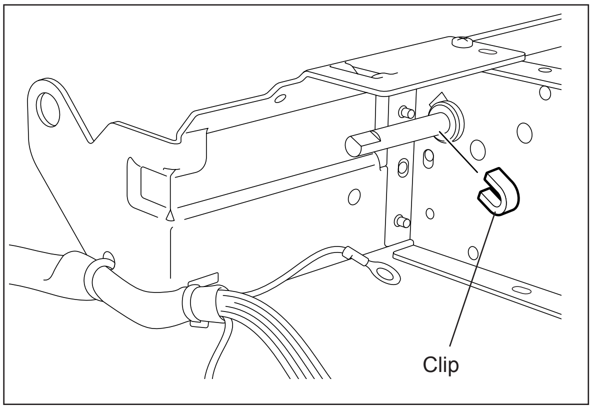


Fig. 14-533

(4) Remove the clip, pulley, belt and pin on the front side.

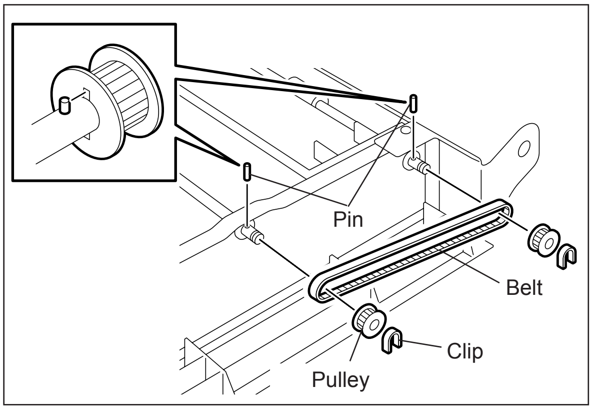

Pin
Belt
Clip
Pulley

Fig. 14-534

(5) Remove 2 bushing and take off the lower transport roller.

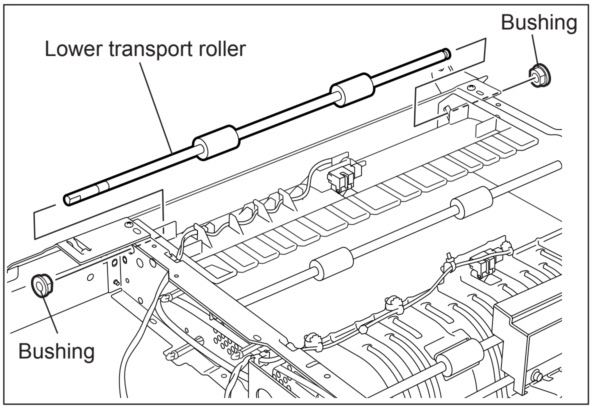

Bushing
Lower transport roller
Bushing

Fig. 14-535

(6) Remove 4 E-rings and take off 2 rollers.

Notes:

1. The roller has a one-way clutch inside. When installing rollers, pay attention to the rotation direction.
2. Replace 2 rollers at a time.

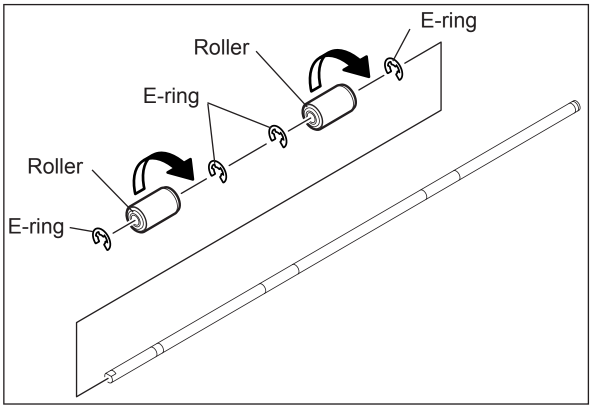

E-ring
Roller
E-ring
Roller
E-ring

Fig. 14-536

15. POWER SUPPLY UNIT

15.1 Construction

The power supply unit consists of an AC filter and insulation type DC output circuits.

(1) AC filter

Eliminates noise from the outside and prevents the noise generated by the equipment from leaking to the outside.

(2) DC output circuits

Converts AC voltage input from outside to DC voltage and supplies it to each electric part. The DC voltage is divided into the following two lines.

a. Main line : Power supply used in the entire equipment during image forming process. Five kinds of voltage (+3.3V, +5.1V, +12V, –12V* and +24V*) are output when the main switch of the equipment is turned ON.

*: e-STUDIO350/450 only

b. Door switch line : Power supply used in the entire equipment during image forming process, being supplied via the door switch. Two kinds of voltage (+5.1VD and +24VD) are output only when the main switch of the equipment is turned ON and two doors (front cover and jam access cover) are closed.

15.2 Operation of DC Output Circuits

(1) Starting line output

When the main switch of the equipment is turned ON, power starts supplying to all the lines only when two doors (front cover and jam access cover) are closed.

(2) Stopping line output

When the main switch of the equipment is turned OFF, PWR-DN signal is output after the instantaneous outage insurance time (20 ms or more) elapses and then the supply of each voltage stops. If the supply of voltage of the main line (+3.3VA, +5.1VA, +12VA, -12VA) stops earlier than the 24V line does, it may cause the damage of the electron device on each control circuit. To prevent this, the supply of these voltages stops after the PWR-DN signal is output and the minimum retaining time (+3.3VA/+5.1VA: 50 ms or more, +12VA/-12VA: 5 ms or more) elapses.

(3) Output protection

Each output system includes an overcurrent and overvoltage protection circuits (a fuse and internal protection circuit). This is to prevent the defectives (damage or abnormal operation of the secondary circuit) which may be caused by an overcurrent due to a short circuit or an overvoltage due to a short circuit between different voltages. If the protection circuit is activated (except the case the fuse is blown out), remove the causes such as short-circuit. Turn ON the power again 1 minute later to clear the overcurrent protection.

15.3 Output Channel

The followings are five output channels which are not linked with the door switch.

(1) +3.3V

+3.3VA : CN412 Pins 13, 14, 15 and 16
Output to the SYS board

+3.3VB : CN412 Pins 19 and 20
Output to the SYS board

+3.3VB : CN413 Pin 1
Output to the LGC board

+3.3VB : CN415 Pins 17 and 18
Output to the SLG board

(2) +5.1V

+5.1VA : CN412 Pins 24 and 26
Output to the SYS board

+5.1VB : CN412 Pin 25
Output to the SYS board

+5.1VB : CN413 Pins 3 and 4
Output to the LGC board, PFP/ LCF (via LGC board),
Bridge unit / Job separator / Offset tray (via LGC board)

+5.1VB : CN413 Pin 11
Output to the FIL board or FUS board

+5.1VB : CN415 Pins 5 and 6
Output to the RADF

+5.1VB : CN415 Pins 21 and 22
Output to the SLG board

+5.1VB : CN416 Pin 1
Output to the finisher

(3) +12V

+12VA : CN412 Pin 7
Output to the SYS board

+12VB : CN412 Pin 5
Output to the SYS board

+12VB : CN413 Pin 7
Output to the LGC board

+12VB : CN415 Pin 15
Output to the SLG board

(4) -12V (e-STUDIO350/450 only)

-12VA : CN412 Pin 9
Output to the SYS board

-12VB : CN412 Pin 3
Output to the SYS board

(5) +24V (e-STUDIO350/450 only)

+24VB : CN413 Pin 13
Output to the FAX board

The followings are two output channels which are linked with the door switch.

(1) +5.1V

+5.1VD : CN414 Pin 9
Output to the LGC board

(2) +24V

+24VD1 : CN414 Pins 1 and 2
Output to the LGC board, PFP/LCF (via LGC board)

+24VD1 : CN418 Pin 1
Output to the power supply cooling fan

+24VD2 : CN414 Pins 5 and 6
Output to the LGC board,
Bridge unit / Job separator / Offset tray (via LGC board)

+24VD3 : CN415 Pins 1 and 2
Output to the RADF

+24VD4 : CN415 Pins 9 and 10
Output to the SLG board

+24VD5 : CN416 Pin 3
Output to the finisher

<<Output connector>>

Not linked with the door switch

CN412	For the SYS board
CN413	For the LGC board, FIL board / FUS board, FAX board (e-STUDIO350/450 only), PFP/LCF (via LCG board), Bridge unit / Job separator / Offset tray (via LGC board)
CN415	For the SLG board, RADF
CN416	For the finisher

Linked with the door switch

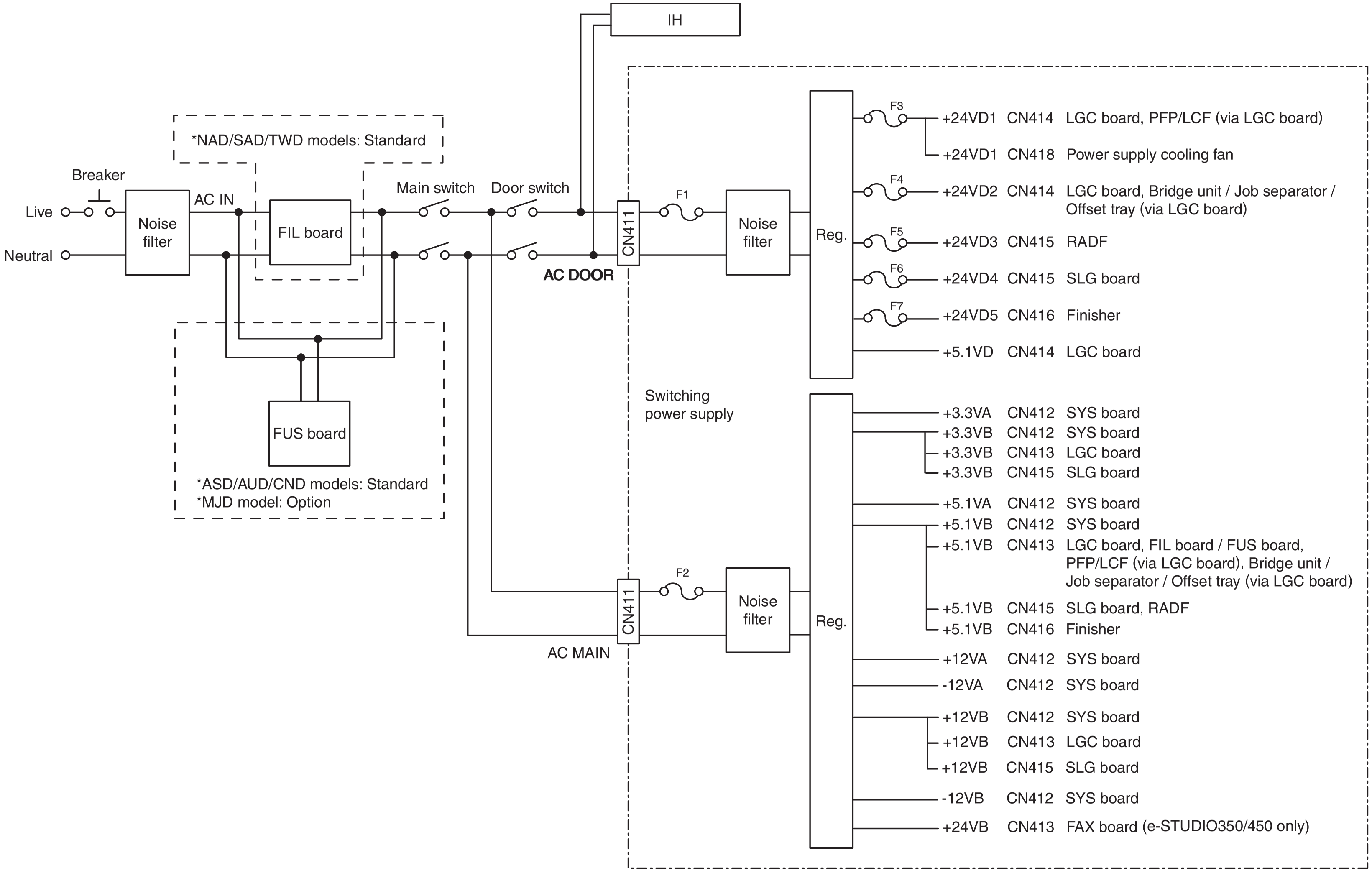
CN414	For the LGC board, PFP/LCF (via LGC board), Bridge unit / Job separator / Offset tray (via LGC board)
CN415	For the SLG board, RADF
CN416	For the finisher
CN418	For the power supply cooling fan

15.4 Fuse

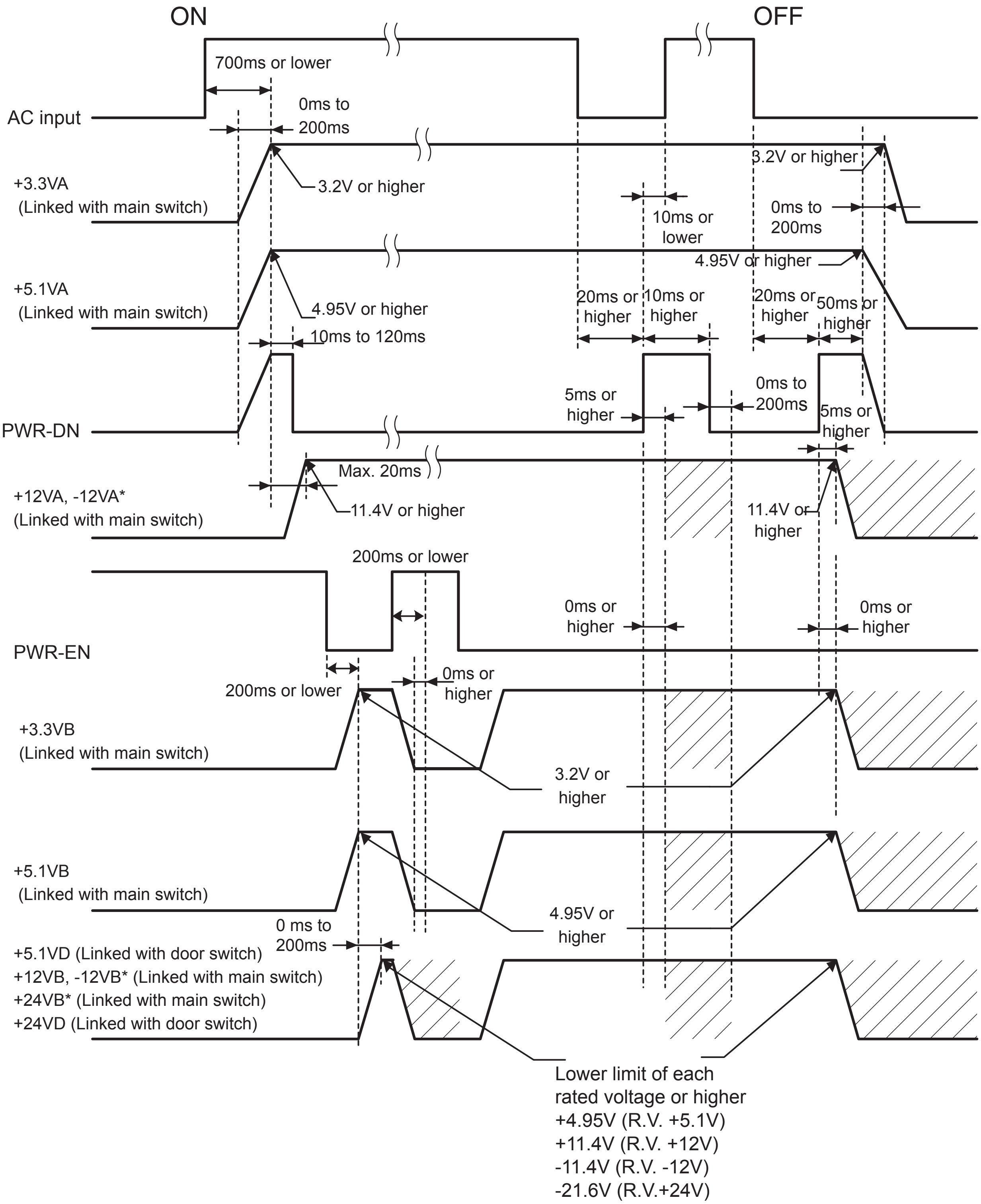
When the power supply secondary fuse is blown out, confirm that there is no abnormality with each part using the following table.

Voltage	Board/Unit	Part	Fuse type
+24VD1	LGC	Polygonal motor	F3: 8A (Semi time-lag)
		ADU motor	
		Tray-up motor	
		Laser unit cooling fan	
		Upper drawer feed clutch	
		Lower drawer feed clutch	
		Bypass feed clutch	
		ADU clutch	
		Transport clutch (High speed)	
		Transport clutch (Low speed)	
		Bypass pickup solenoid	
	Power supply	Power supply cooling fan	
	PFP/LCF		
+24VD2	LGC	Exit motor	F4: 8A (Semi time-lag)
		Main motor	
		Toner motor	
		Middle fan	
		Exhaust fan	
		Sub-separation fan	
		Fuser unit cooling fan	
		IH board cooling fan	
		Developer unit cooling fan-1	
		Developer unit cooling fan-2	
		Auto-toner sensor	
		Registration clutch	
		Developer drive clutch	
		Discharge LED	
		Key copy counter / Copy key card	
	Bridge unit / Job separator / Offset tray		
+24VD3	RADF		F5: 4A (Semi time-lag)
+24VD4	SLG	Scan motor	F6: 4A (Semi time-lag)
		Exposure lamp (Lamp inverter)	
+24VD5	Finisher		F7: 5A (Semi time-lag)

15.5 Configuration of Power Supply Unit

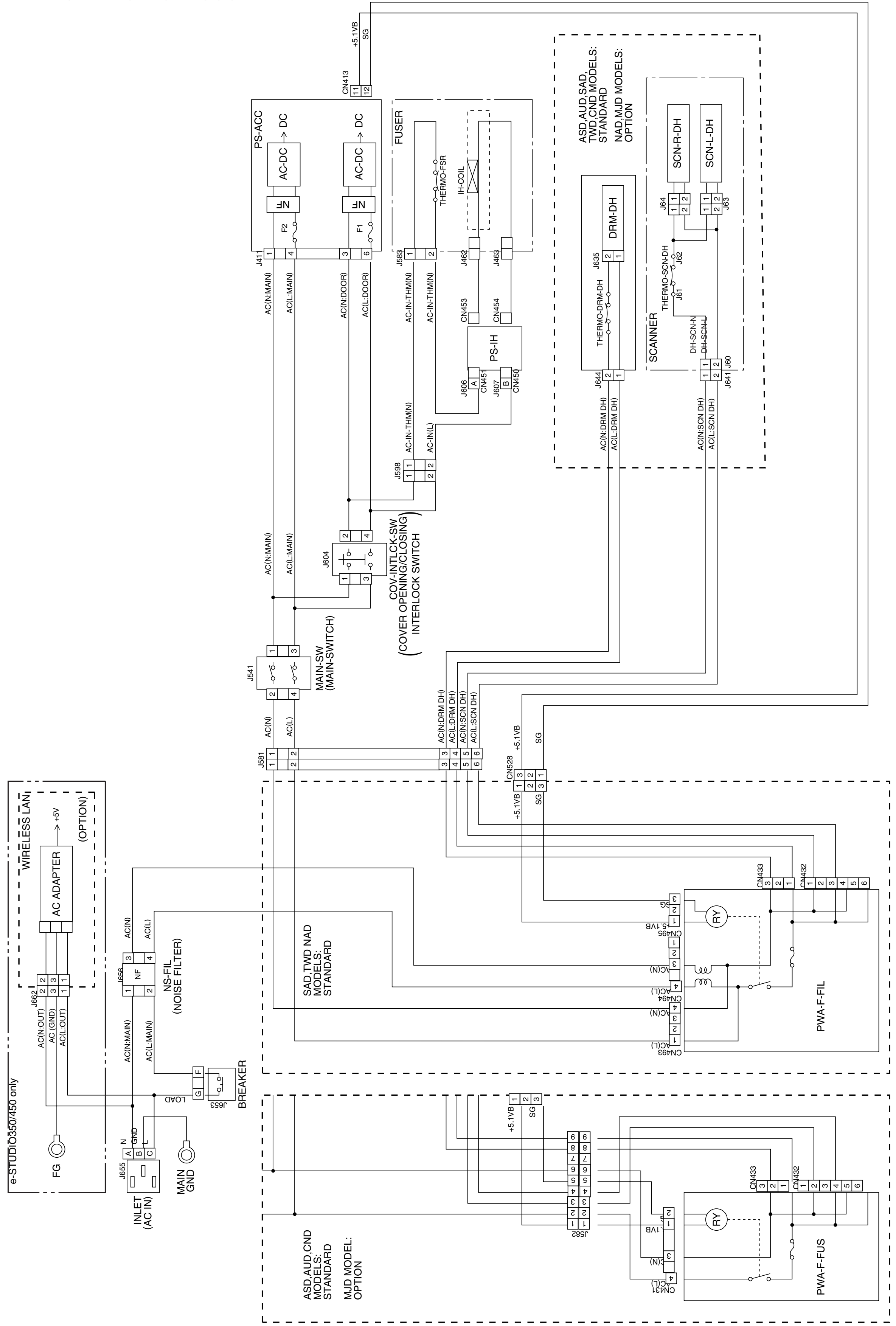

IH
*NAD/SAD/TWD models: Standard
Breaker
Live
Neutral
Noise filter
AC IN
FIL board
Main switch
Door switch
AC DOOR
FUS board
*ASD/AUD/CND models: Standard
*MJD model: Option
AC MAIN
CN411
F1
F2
Noise filter
Noise filter
Switching power supply
Reg.
Reg.
F3
F4
F5
F6
F7
+24VD1 CN414 LGC board, PFP/LCF (via LGC board)
+24VD1 CN418 Power supply cooling fan
+24VD2 CN414 LGC board, Bridge unit / Job separator / Offset tray (via LGC board)
+24VD3 CN415 RADF
+24VD4 CN415 SLG board
+24VD5 CN416 Finisher
+5.1VD CN414 LGC board
+3.3VA CN412 SYS board
+3.3VB CN412 SYS board
+3.3VB CN413 LGC board
+3.3VB CN415 SLG board
+5.1VA CN412 SYS board
+5.1VB CN412 SYS board
+5.1VB CN413 LGC board, FIL board / FUS board, PFP/LCF (via LGC board), Bridge unit / Job separator / Offset tray (via LGC board)
+5.1VB CN415 SLG board, RADF
+5.1VB CN416 Finisher
+12VA CN412 SYS board
-12VA CN412 SYS board
+12VB CN412 SYS board
+12VB CN413 LGC board
+12VB CN415 SLG board
-12VB CN412 SYS board
+24VB CN413 FAX board (e-STUDIO350/450 only)

15.6 Sequence of Power Supply


ON
OFF
AC input
700ms or lower
0ms to 200ms
+3.3VA
(Linked with main switch)
3.2V or higher
3.2V or higher
10ms or lower
0ms to 200ms
+5.1VA
(Linked with main switch)
4.95V or higher
4.95V or higher
10ms to 120ms
20ms or higher
10ms or higher
20ms or higher
50ms or higher
PWR-DN
5ms or higher
0ms to 200ms
5ms or higher
+12VA, -12VA*
(Linked with main switch)
Max. 20ms
11.4V or higher
11.4V or higher
200ms or lower
PWR-EN
0ms or higher
0ms or higher
200ms or lower
0ms or higher
+3.3VB
(Linked with main switch)
3.2V or higher
+5.1VB
(Linked with main switch)
4.95V or higher
0 ms to 200ms
+5.1VD (Linked with door switch)
+12VB, -12VB* (Linked with main switch)
+24VB* (Linked with main switch)
+24VD (Linked with door switch)
Lower limit of each rated voltage or higher
+4.95V (R.V. +5.1V)
+11.4V (R.V. +12V)
-11.4V (R.V. -12V)
-21.6V (R.V.+24V)

*: e-STUDIO350/450 only

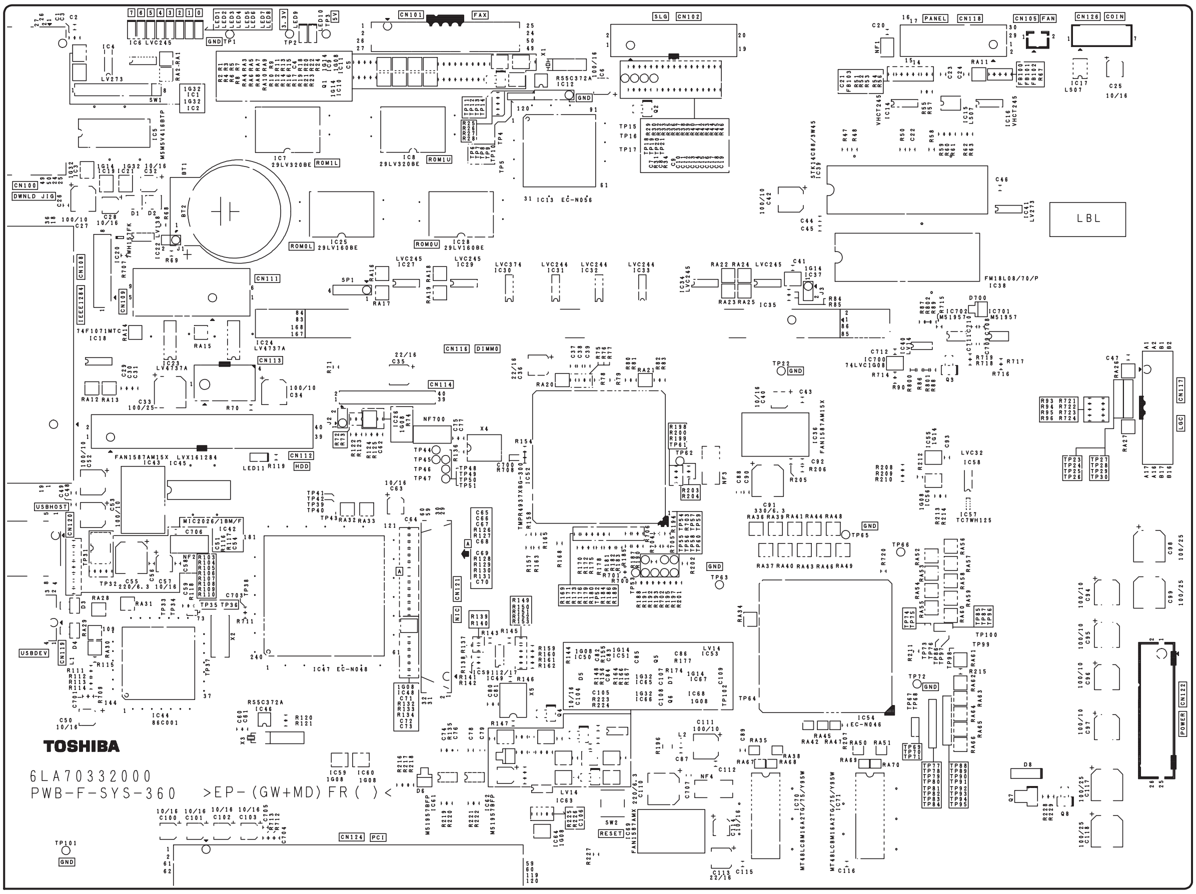
15.7 AC Wire Harness


PS-ACC
AC-DC
DC
NF
F1
F2
J411
CN413
+5.1VB
SG
FUSER
THERMO-FSR
IH-COIL
J583
J462
J463
CN453
CN454
PS-IH
J606
CN451
J607
CN450
J598
AC(N:MAIN)
AC(L:MAIN)
AC(N:DOOR)
AC(L:DOOR)
AC-IN-THM(N)
AC-IN(L)
ASD,AUD,SAD, TWD,CND MODELS: STANDARD
NAD,MJD MODELS: OPTION
SCN-R-DH
SCN-L-DH
J64
J63
J62
J61
J60
DRM-DH
J635
THERMO-DRM-DH
THERMO-SCN-DH
DH-SCN-N
DH-SCN-L
SCANNER
J644
J641
AC(N:DRM DH)
AC(L:DRM DH)
AC(N:SCN DH)
AC(L:SCN DH)
J604
COV-INTLCK-SW (COVER OPENING/CLOSING INTERLOCK SWITCH)
J541
MAIN-SW (MAIN-SWITCH)
AC(N)
AC(L)
J581
CN528
WIRELESS LAN
AC ADAPTER
+5V
(OPTION)
e-STUDIO350/450 only
J662
AC(N:OUT)
AC (GND)
AC(L:OUT)
FG
J656
NF
NS-FIL (NOISE FILTER)
BREAKER
J653
LOAD
J655
N
GND
L
INLET (AC IN)
MAIN GND
SAD,TWD,NAD MODELS: STANDARD
CN433
CN432
CN495
CN494
CN493
RY
PWA-F-FIL
J582
CN431
PWA-F-FUS
ASD,AUD,CND MODELS: STANDARD
MJD MODEL: OPTION

16. PC BOARDS

(1) PWA-F-SYS

e-STUDIO350/450


TOSHIBA
6LA70332000
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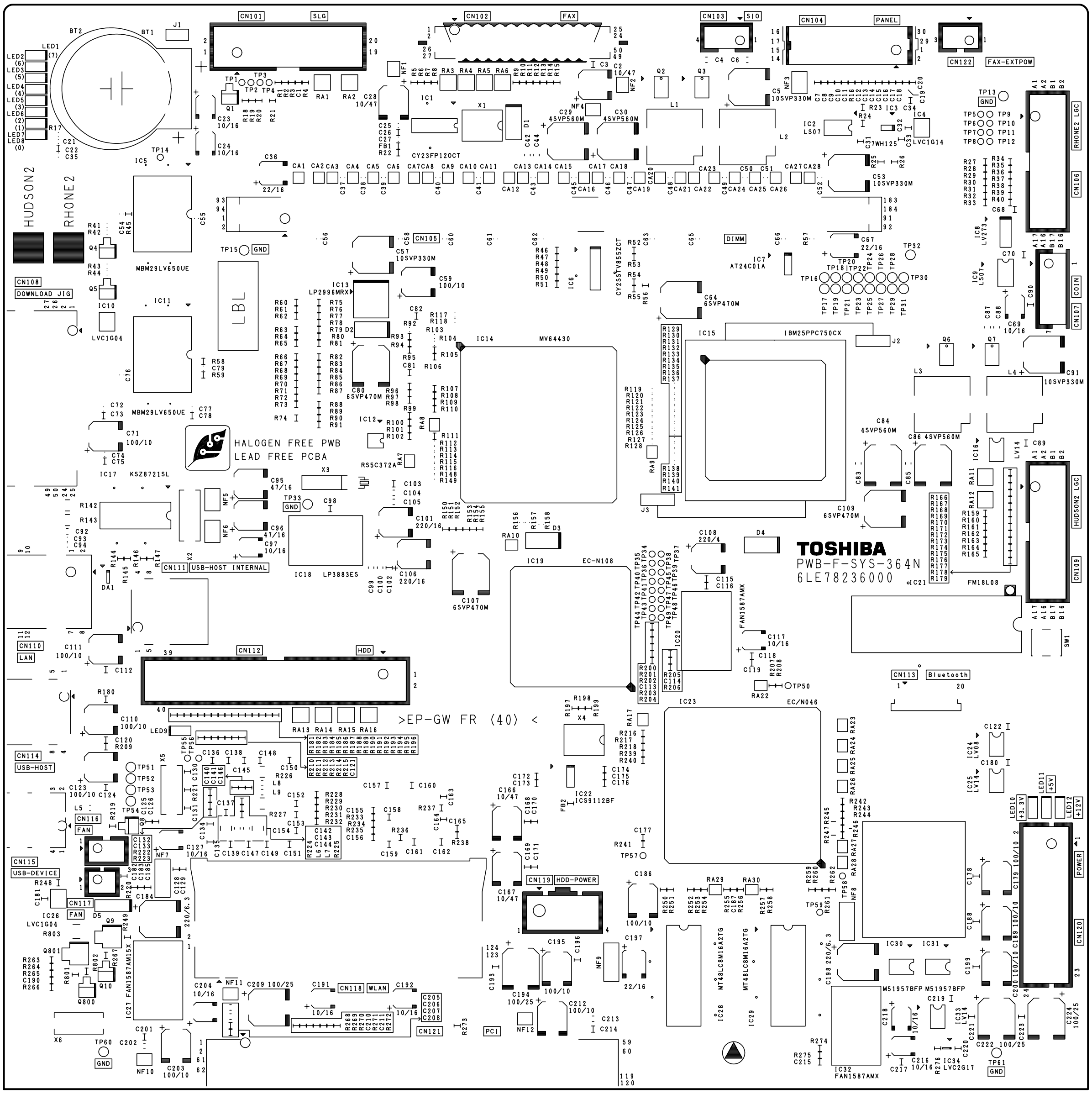
CN101
FAX
SLG
CN102
PANEL
CN118
CN105
FAN
CN126
COIN
CN100
DWNLD JIG
ROM1L
ROM1U
ROM0L
ROM0U
CN111
CN116
DIMM0
CN114
CN112
HDD
USBHOST
USBDEV
CN117
CN122
POWER
CN124
PCI
LBL
RESET
GND

16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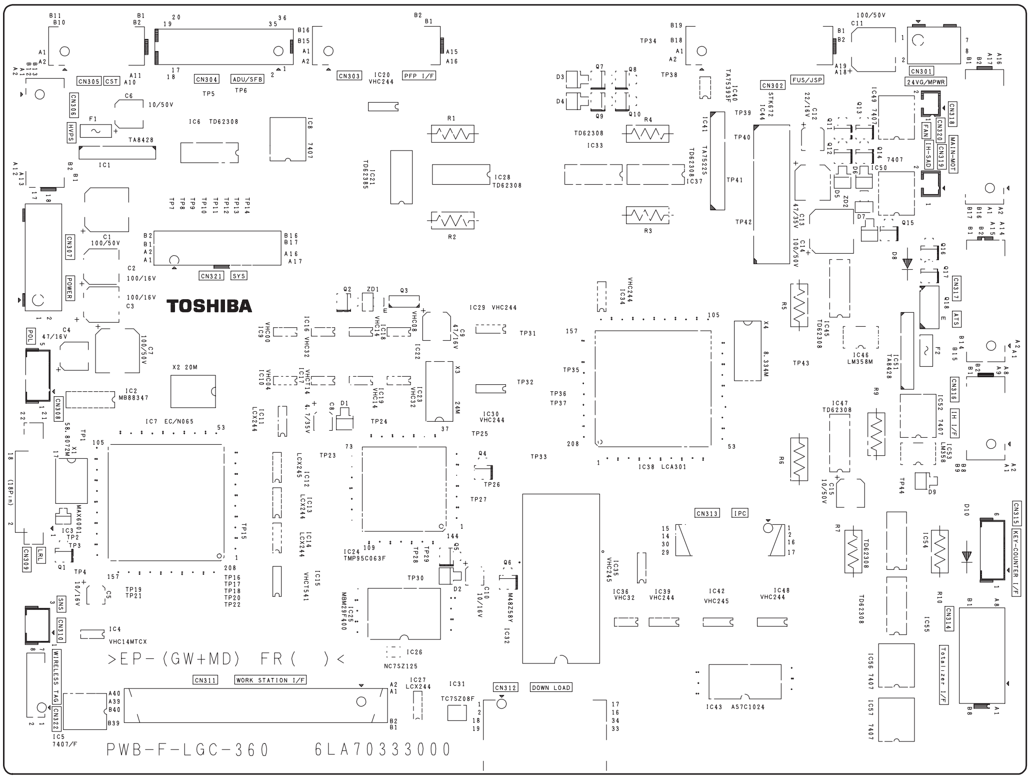
CN102 FAX
CN103 SIO
CN104 PANEL
CN122 FAX-EXTPOW
CN105
CN106 RHONE2 LGC
CN107 COIN
CN108 DOWNLOAD JIG
CN109 HUDSON2 LGC
CN110 LAN
CN111 USB-HOST INTERNAL
CN112 HDD
CN113 Bluetooth
CN114 USB-HOST
CN115 USB-DEVICE
CN116 FAN
CN117 FAN
CN118 WLAN
CN119 HDD-POWER
CN120 POWER
CN121 PCI
HUDSON2
RHONE2
LBL
DIMM
HALOGEN FREE PWB
LEAD FREE PCBA
TOSHIBA
PWB-F-SYS-364N
6LE78236000
>EP-GW FR (40) <
IC14 MV64430
IC15 IBM25PPC750CX
IC19 EC-N108
IC23 EC/N046
IC17 KSZ8721SL
IC18 LP3883ES
IC13 LP2996MRX
IC5 MBM29LV650UE
IC11 MBM29LV650UE
IC22 ICS9112BF
IC28 MT48LC8M16A2TG
IC29 MT48LC8M16A2TG
IC32 FAN1587AMX
IC27 FAN1587AM15X
IC21 FM18L08
CY23FP12OCT
CY25S1V85ZCT
AT24C01A
R55C372A
M51957BFP M51957BFP
SW1
+3.3V
+5V
+12V

(2) PWA-F-LGC

e-STUDIO350/450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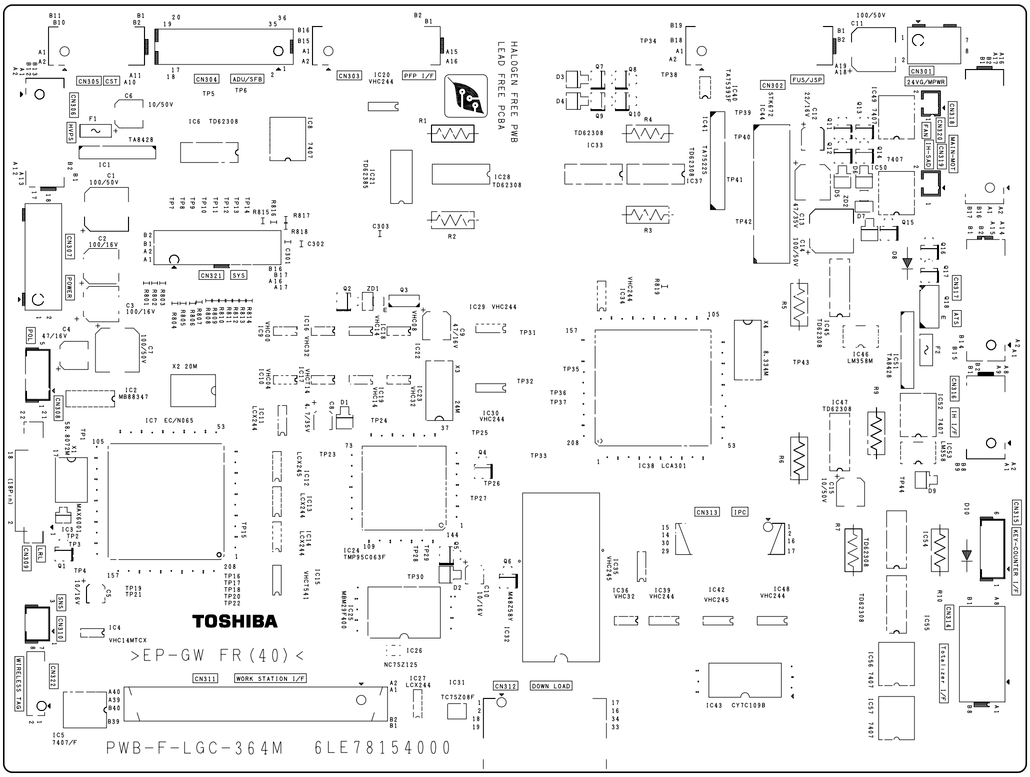
CN304 ADU/SFB
CN303 PFP I/F
CN302 FUS/JSP
CN301 24VG/MPWR
CN306 HVPS
CN307 POWER
CN321 SYS
CN308 PDL
CN309 LRL
CN310 SNS
CN322 WIRELESS TAG
CN311 WORK STATION I/F
CN312 DOWN LOAD
CN313 IPC
CN314 Totalizer I/F
CN315 KEY-COUNTER I/F
CN316 IH I/F
CN317 ATS
CN318 FAN
CN320 IH-SAD
CN319 MAIN-MOT
TOSHIBA
>EP-(GW+MD) FR( )<
PWB-F-LGC-360 6LA70333000

e-STUDIO352/353/452/453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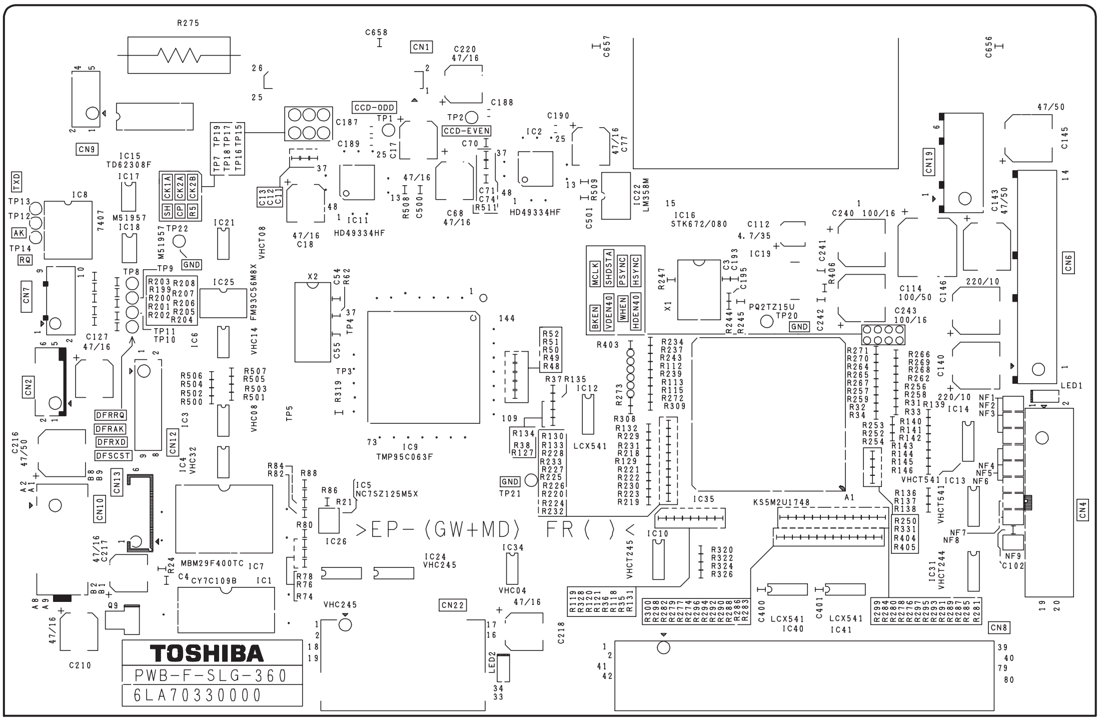
LEAD FREE PCBA
CN305 CST
CN304 ADU/SFB
CN303 PFP I/F
CN302 FUS/JSP
CN301 24VG/MPWR
CN306 HVPS
CN307 POWER
CN321 SYS
CN308 PDL
CN309 LRL
CN310 SNS
CN322 WIRELESS TAG
CN311 WORK STATION I/F
CN312 DOWN LOAD
CN313 IPC
CN314 Totalizer I/F
CN315 KEY-COUNTER I/F
CN316 IH I/F
CN317 ATS
CN318 FAN
CN320 IH-SAD
CN319 MAIN-MOT
TOSHIBA
>EP-GW FR(40)<
PWB-F-LGC-364M 6LE78154000

(3) PWA-F-SLG

e-STUDIO350/450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PWB-F-SLG-360
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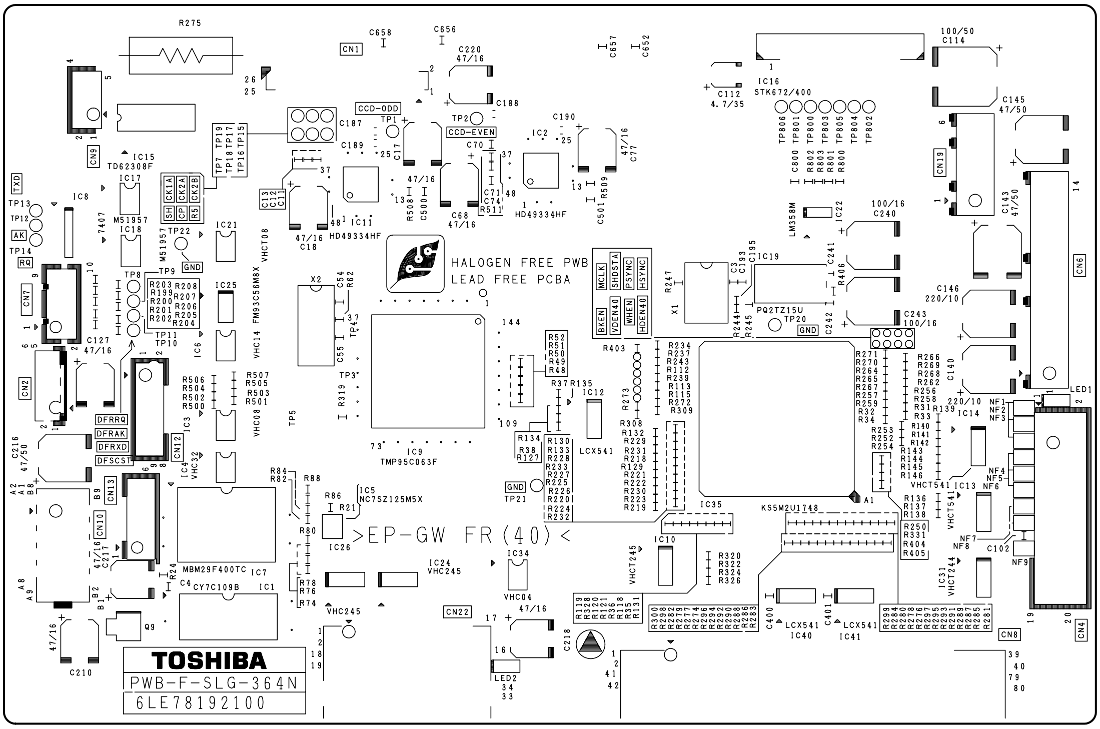
e-STUDIO352/353/452/453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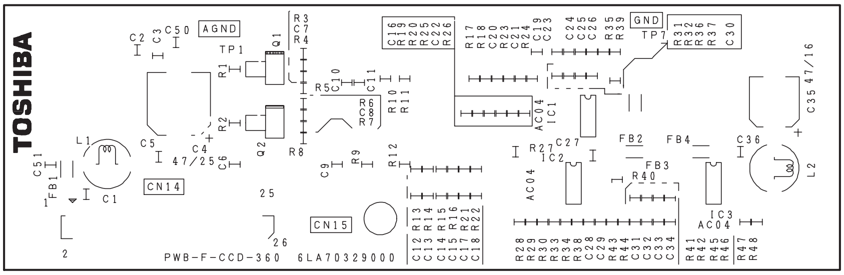
HALOGEN FREE PWB
LEAD FREE PCBA
>EP-GW FR(40)<

(4) PWA-F-CCD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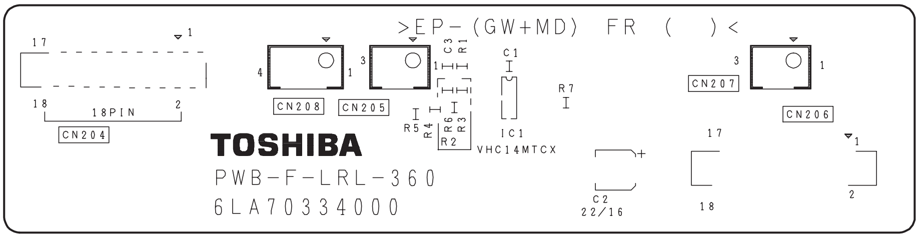
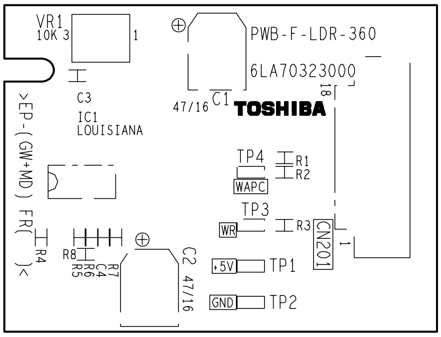
AGND
GND
TP1
TP7
Q1
Q2
L1
L2
C1
C51
FB1
C5
C4
47/25
CN14
CN15
25
26
2
IC1
IC2
IC3
AC04
FB2
FB3
FB4
R40
C36
C35 47/16
PWB-F-CCD-360 6LA70329000

(5) PWA-F-LRL


>EP-(GW+MD) FR ( )<
17
1
18
2
18PIN
CN204
CN208
CN205
CN207
CN206
TOSHIBA
PWB-F-LRL-360
6LA70334000
IC1
VHC14MTCX
R7
C1
C2
22/16
17
18

(6) PWA-F-LDR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10K
PWB-F-LDR-360
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C1
47/16
TOSHIBA
C3
IC1
LOUISIANA
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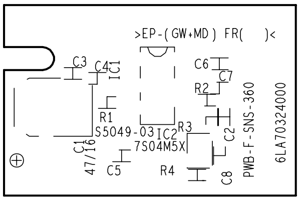
TP4
WAPC
R1
R2
TP3
WR
R3
CN201
18
1
R4
R8
R6
R5
R7
C4
C2
47/16
+5V
TP1
GND
TP2

(7) PWA-F-SNS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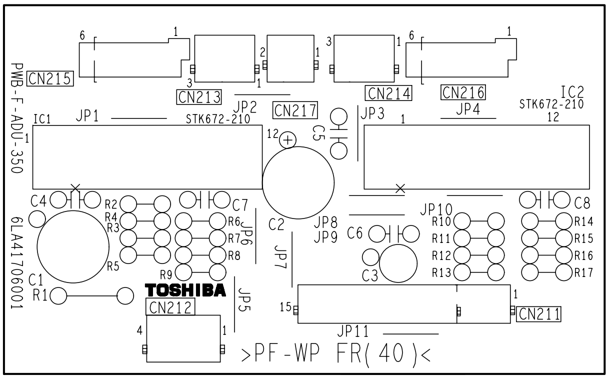
C4
IC1
C6
C7
R2
R1
S5049-03
IC2
R3
C2
7S04M5X
C1
47/16
C5
R4
C8
PWB-F-SNS-360
6LA70324000

(8) PWA-F-ADU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CN215
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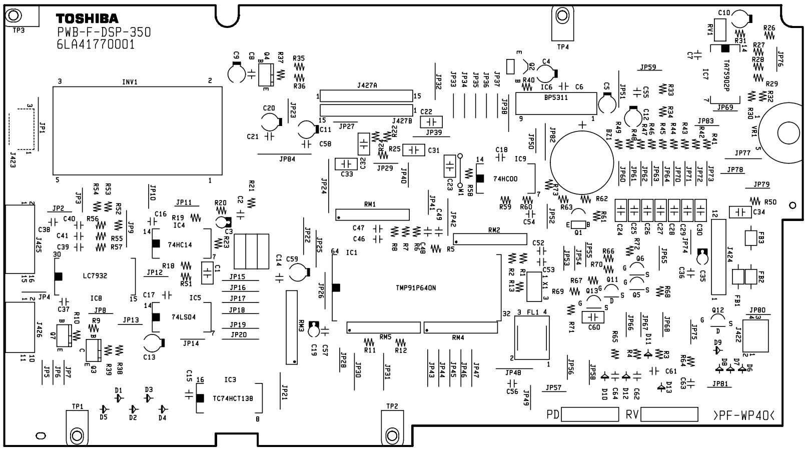
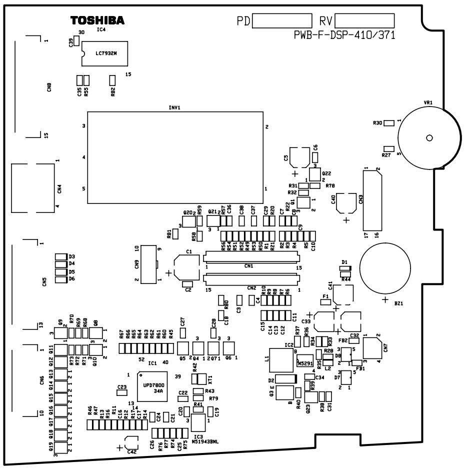
CN217
CN214
CN216
IC2
STK672-210
IC1
JP1
STK672-210
JP3
JP4
C5
C4
C7
C8
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
C1
C2
C3
C6
JP5
JP6
JP7
JP8
JP9
JP10
JP11
TOSHIBA
CN212
CN211
>PF-WP FR(40)<

(9) PWA-F-DSP

e-STUDIO350/450

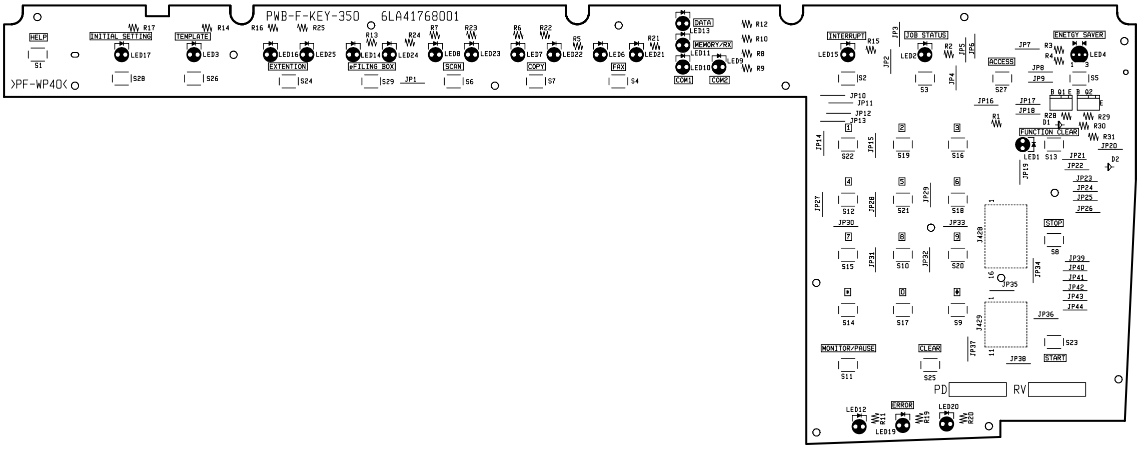

TOSHIBA
PWB-F-DSP-350
6LA41770001
INV1
TMP91P640N
74HC14
74LS04
TC74HCT138
LC7932
74HC00
BP5311
TA75902P
J427A
J427B
VR1
TP1
TP2
TP3
TP4
PD
RV
>PF-WP40<

e-STUDIO352/353/452/453

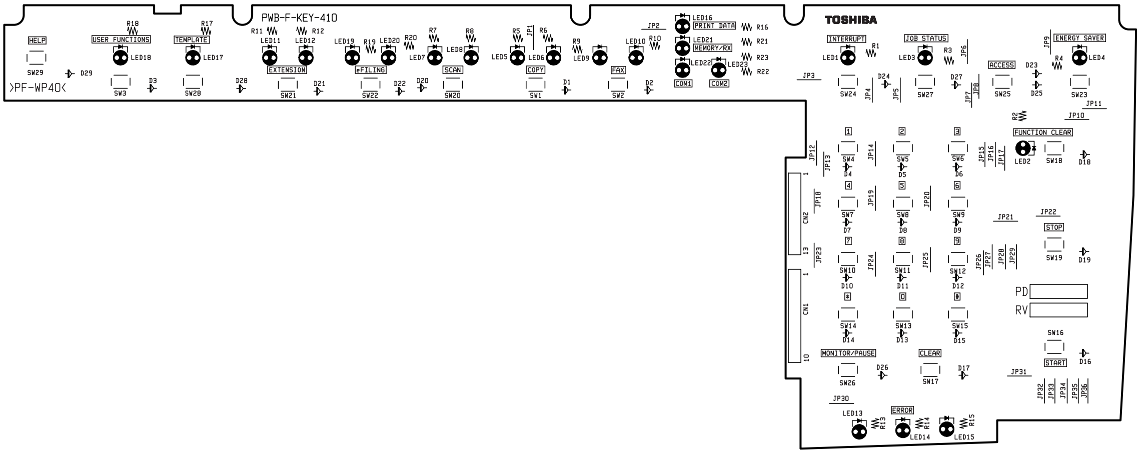

TOSHIBA
PD
RV
PWB-F-DSP-410/371
LC7932M
INV1
VR1
CN1
CN2
BZ1

(10) PWA-F-KEY

e-STUDIO350/450

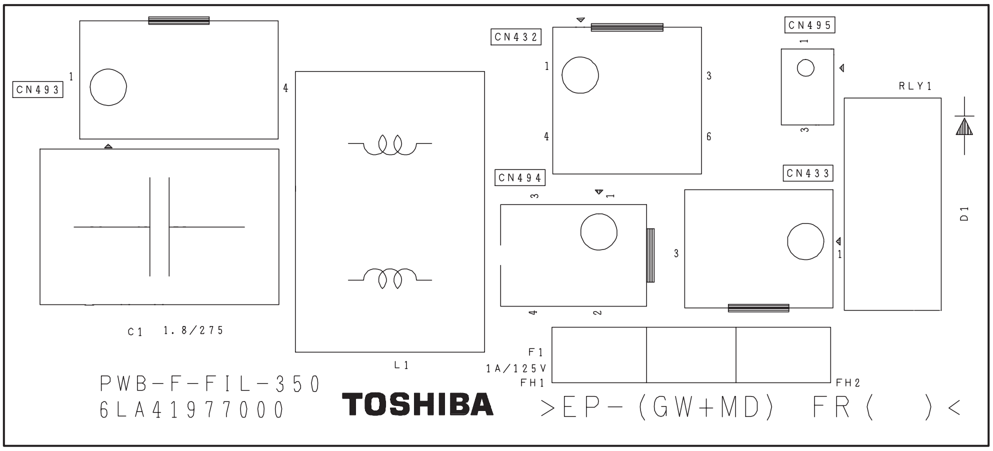

PWB-F-KEY-350 6LA41768001
>PF-WP40<
HELP
INITIAL SETTING
TEMPLATE
EXTENTION
eFILING BOX
SCAN
COPY
FAX
DATA
MEMORY/RX
COM1
COM2
INTERRUPT
JOB STATUS
ACCESS
ENERGY SAVER
FUNCTION CLEAR
STOP
START
MONITOR/PAUSE
CLEAR
ERROR
PD
RV

e-STUDIO352/353/452/453


PWB-F-KEY-410
TOSHIBA
>PF-WP40<
HELP
USER FUNCTIONS
TEMPLATE
EXTENSION
eFILING
SCAN
COPY
FAX
PRINT DATA
MEMORY/RX
COM1
COM2
INTERRUPT
JOB STATUS
ACCESS
ENERGY SAVER
FUNCTION CLEAR
STOP
START
MONITOR/PAUSE
CLEAR
ERROR
CN1
CN2
PD
RV

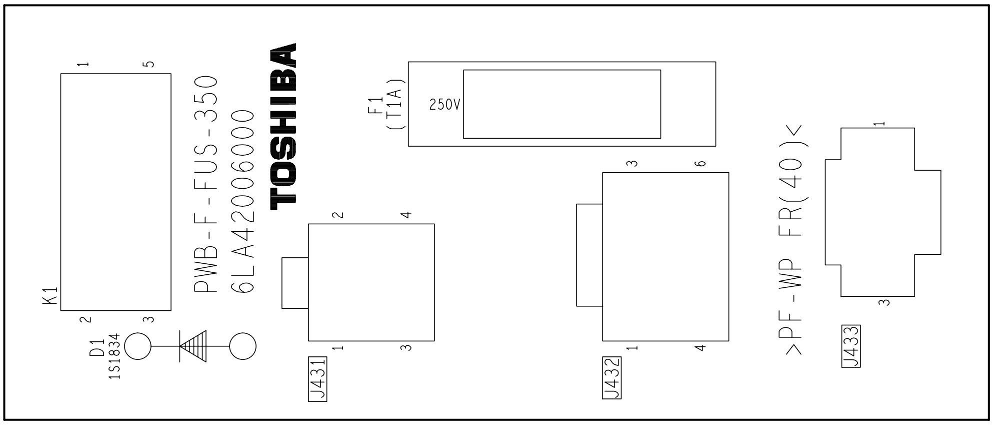
(11) PWA-F-FIL

(* NAD/SAD/TWD models: Standard)


CN493
CN432
CN495
CN494
CN433
RLY1
D1
C1 1.8/275
L1
F1
1A/125V
FH1
FH2
PWB-F-FIL-350
6LA41977000
TOSHIBA
>EP-(GW+MD) FR( )<

(12) PWA-F-FUS

(* ASD/AUD/CND models: Standard, MJD model: Option)


PWB-F-FUS-350
6LA42006000
TOSHIBA
F1
(T1A)
250V
K1
D1
1S1834
J431
J432
J433
>PF-WP FR(40)<
1
2
3
4
5
6

TOSHIBA

TOSHIBA TEC CORPORATION

2-17-2, HIGASHIGOTANDA, SHINAGAWA-KU, TOKYO, 141-8664, JAPAN